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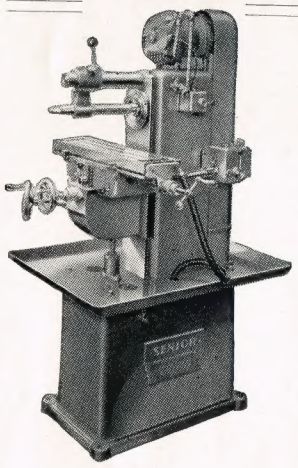

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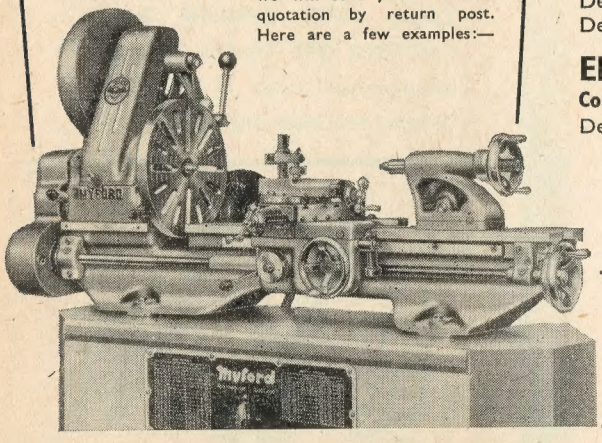

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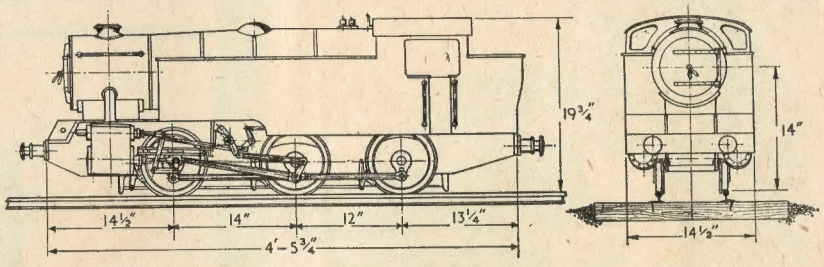

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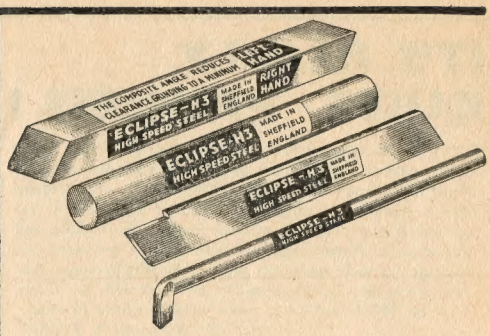

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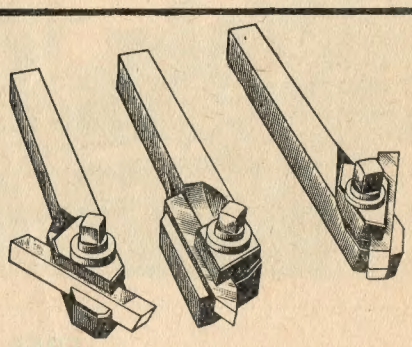

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Model Engineer

7 MARCH 1957 VOLUME 116 No 2911

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Boring and sawing collets

Musical clock queries: C. B. Reeve deals with some of the problems which have faced constructors

A trip-operated signal

All correspondence should be addressed to the Editor, Model Engineer, 19-20 Noel Street, London, W.1.

Smoke Rings

A WEEKLY COMMENTARY BY VULCAN

THE rules for the M.E. Speedboat Competition have now been revised in accordance with the suggestions outlined in the issue of October18, Mr E. T. Westbury tells me. The competition will be for one class only, embracing boats up to a limit of 16 lb. all-on weight, with i.c. engines limited to 30 c.c. total capacity, and steam plants of unlimited engine and boiler dimensions within the weight limit.

The awards will comprise silver and bronze medals for both i.c. and steam-driven boats, and certificates of performance for all boats achieving a speed of not less than 45 m.p.h.

Points will be awarded for design, workmanship and originality, in addition to actual speed performance. Any runs made since the beginning of the 1956 season may be submitted and those attained at an organised M.P.B.A. event will be eligible without further evidence.

Entry forms are now ready and can be obtained from this office on receipt of a 2½d. stamp. Entries must be received on or before March 25.

High precision

THE article on the construction of a precision drill chuck by Mr A. A. Sherwood in this issue provides a typical example of how the most precise work can be produced in a modestly-equipped workshop by following correct methods and sparing no pains. Difficult and complicated machining operations, so far from being a deterrent to model engineers, serve as a challenge to their ingenuity and craftsmanship, keeping interest alive and providing ever new worlds to conquer.

The author of the article is perhaps best remembered in connection with the "Dot" series of ultra-miniature model flash-steam boats described during the war, and for experiments with equally small compression-ignition engines and boats at a later date. In all cases these were noteworthy for ingenuity and precision of a very uncommon order, and it is beyond question that they gave an incentive to many other readers to attempt, and generally achieve, results which appeared previously to be impossible.

Mr Sherwood emigrated to Australia a few years ago and now occupies an important position in the engineering department of Sydney University.

Those steamers!

THERE appears to be no let-up in the flow of ideas designed to combat our present petrol restrictions.

Latest one to catch my eye concerns a Maidstone, Kent, brewery which has hired a 23-year-old steam wagon to deliver its beer supplies. As a result this firm estimates that it is now saving 30 gallons of petrol a week.

Speaking of steam I recall another brewery—situated in West London—which for many years employed half

SMOKE RINGS . . .

a dozen steam lorries for delivery purposes. After the war this firm went over to diesel. Not only was it more economical, but replacements were becoming increasingly difficult to obtain, and so the wagons—all Fodens—were scrapped.

I appreciate that it is all very well to be wise after the event, but if only. . . .

Musical clock

SEVERAL readers building the M.E. Musical Clock have availed themselves of my offer of strips of $\frac{1}{2}$ in. × 0.008 in. spring for supporting the pendulum. There are still about 10 pieces left and I would be glad to send a strip free to any reader enclosing a stamped addressed envelope.

One reader, Mr William C. Foster, of Bridgwater, Somerset, tells me that he hopes to have the movement finished in time for this year's Model Engineer Exhibition.

I am always glad to hear of people who are willing to submit partly finished models for exhibition for they often reveal facets of construction and skill in craftsmanship which are concealed by the finished article. In this way they are a great help to others in the process of building similar models.

However, I must point out that such pieces are more suited to the Loan Section; the owners could then submit the completed models for competition at a later exhibition.

Mr Foster has also been taken by the friendliness and kindliness of other horologists. He writes: "It is very good to see the helpful gestures and information offered by the 'clock-making fraternity.' I had no idea there were so many of us."

This is the proof !

A FAVOURITE question in the Upper Fifth when I was at school was whether a spark ignition engine would run satisfactorily on whisky. There being no one with a rich enough uncle to arrange a practical test it has been left to this paradoxical age of opulence and shortages to provide the answer.

The registration letters ALE of the M.G. Midget on our cover of February 14 prompted Mr W. Drysdale, of Perthshire, to remind me of a recent happening which should set questioning minds finally at rest.

It appears that a woman was out shopping in her car with her schoolboy son when, still a few miles from home, her tank ran dry. It was the last of her ration and she was stranded. But her son, realising that with a bottle of whisky in the shopping basket this was the moment that the schoolboy population of Britain had been awaiting for nearly half a century, exhorted his parent to pour the Scotch in the tank.

The mother did so and, according to reports, the car, a Humber Hawk, went like a bomb.

Sorting them out

AT last a major car manufacturer has virtually admitted that the three-speed gearbox is not all it has been cracked up to be. The admission is not in so many words, mind you—the makers have fitted synchromesh to first gear so that the driver can drop into first while the car is moving. That is something which was quite impossible in any of the earlier models produced by this or any other firm although the manufacturer in question has the finest box on the market in its class in every other respect.

I think, it is all the fault of that wretched steering-column gear lever with its multitude of connections and complete lack of "feel." On a car with a floor-mounted gear lever it is quite simple to change down into first with plenty of revs and nicely synchronised engine and road speeds. I grant that the steering-column change offers more room on the front seat, but Rovers seems to have found the perfect compromise—and I do not think any car manufacturer need feel ashamed about borrowing ideas from this firm.

Cover picture

This sturdy little trawler THE GOOD COMPANION, *based on the Percival Marshall plans for the motor trawler* GLEANER, *was constructed by L. G. Warner who contributed an article on the subject in* MODEL ENGINEER *for* 10 *May* 1956. *It has won an award for its fine craftsmanship.*

Welcoming a stranger

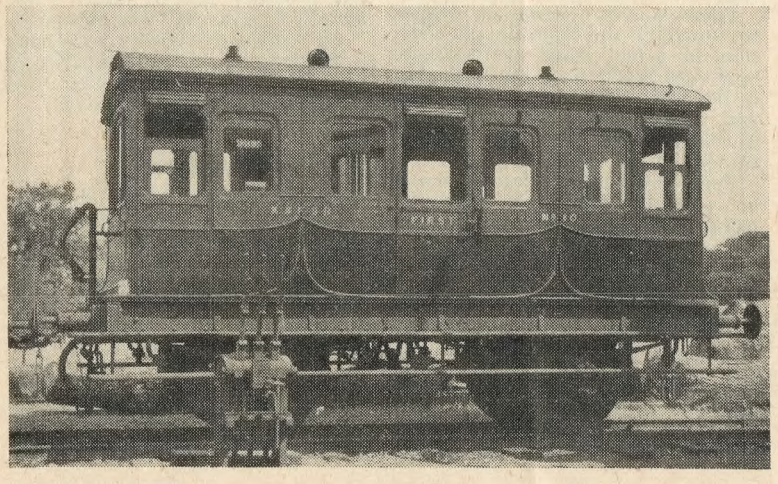
TAKING up residence in a foreign country, especially when one is only 17, can be a rather frightening business, but there is one young model engineer for whom the task of settling among strangers was made comparatively easy.

When the Bristol S.M.E.E. heard that Kelvin Kellaway, an enthusiastic model engineer with an unfinished *Maisie* in his luggage, was on his way to join the staff of the Bristol Aeroplane Co. as an apprentice they sent him a cordial letter of welcome, expressing the hope that his *Maisie*, when completed, would show her paces on the club's track at Canford Park.

Kelvin's father, who is president of the Durban S.M.E., was very moved by this demonstration of warm-heartedness towards his son and he mentions in a letter: "Such friendliness certainly cheers my heart and I feel sure that Kelvin will soon find congenial pals in his new country among the fraternity of model engineers."

A letter from Mr Kellaway senior also appears in Postbag

A four-wheel Royal Saloon built for the L.S.W.R. in 1848. *It was purchased by the Plymouth Devonport and South Western Junction Railway in* 1890, *and in* 1905 *was transferred to the Rother Valley Line by Colonel Stephens, who had a controlling interest in both lines. He subsequently used it as an inspection coach*



The MUNCASTER steam-engine models

EDGAR T. WESTBURY is reviewing some classic models of the past in the light of modern techniques

Continued from 21 February 1957, pages 270—272

READERS will no doubt have noticed that the drawings of the simple engine described in the last article were not fully dimensioned, and just in case there should be any complaints about this I will anticipate them by saying that Muncaster, in common with many pioneer model designers, did not consider it necessary to give more than a few leading dimensions on drawings.

I have, however, added a scale which should be helpful in supplying the deficiency, in conjunction either with a simply-made scale rule or a pair of proportional dividers.

The present-day engineer is accustomed to drawings which have every dimension, including in many cases limits and clearances, fully marked, as this is absolutely necessary in industrial production, where different parts have to be made, or even successive operations carried out on single parts, by individual workers out of direct touch with each other.

Use initiative

In cases where all the machining and fitting on a one-off job are in the hands of a single constructor, however, meticulous marking of every essential and non-essential dimension is by no means so important. While I should be the last to condone inaccurate or slipshod work in any kind of model engineering, I believe that one can become a slave of the blueprint, and it is good engineering practice to work occasionally to what the professional engineer would consider inadequate drawings or specifications, if only because it helps one to cultivate a sense of proportion.

In the field of natural history, reasonably accurate re-constructions of prehistoric animals were made from fragments of fossil bones long before they could be verified by further evidence; and many model engineers have produced good work with nothing more in the way of information than a few rough sketches and possibly a photograph or two.

I must confess that I have not a great deal of patience with the type of reader who makes a major issue out of a missing dimension or a slight discrepancy in a drawing; the more complicated drawings become, the more difficult it is to avoid minor errors which escape the most careful checking, and the more likely they are to deter the timid beginner from tackling construction.

2—Double-acting oscillating engines

DOUBLE-ACTING OSCILLATING CYLINDER ENGINE

Unlike the previous engine, the construction of this example, illustrated in Fig. 7, favours the use of castings for the main structural parts, though they can be produced by cutting from the solid and fabrication. For instance, the hollow base, *D*, could be made by soldering or brazing a rectangular frame of strip material to a flat plate, and the bearing supports or A-frames, *F*, could be made by bending strip material to the profile, as seen in the end view, and soldering or brazing in the curved supporting rib or crossbar.

It is most important that these frames should stand exactly perpendicular to the base when fitted and that the top surfaces which form the bearing seatings should be exactly the same height and in alignment. While it is possible to correct errors in these respects by packing under the feet of the frames or the bearings, this is certainly not a practice to be encouraged.

If the cylinder, *A*, is made from stock material, the circular portface may be made from a piece of $\frac{7}{8}$ in. dia. bar, filed or machined to fit closely to the side of the barrel and preferably secured by silver soldering. At the same time, short half-round pieces can be fitted above and below this face. It will be seen that a boss or spigot is provided on the opposite side of the barrel to receive the point of a pivot screw, and this should similarly be fixed, exactly in diametric alignment with the portface.

The drawing shows a raised beading in the centre of the cylinder; this is not a necessity, but is desirable both from the point of appearance and also to stiffen the cylinder wall. For machining the bore and facing one end flange, I recommend mounting on an angle plate with a strap bearing on the spigot, but care should be taken not to apply so much pressure as to risk distortion of the barrel. The other end flange is faced by mounting on a mandrel.

Mark off centres

It is absolutely essential that the centre indentation in the spigot should be dead in line with the hole in the centre of the portface, and in order to ensure this, it would be a sound policy to mark off these centres with a surface gauge, with the cylinder resting on the machined flange face to locate the horizontal line, and then mounting it on a mandrel resting in V-blocks for the vertical line. The intersections on both sides are then centre-drilled, and the cylinder mounted between centres for machining the portface.

Flanged covers are secured, each by four screws, to the ends of the cylinder, and as the engine is double-acting the upper cover is fitted with a gland, or "stuffing-box" as it was termed by the early engineers. It is important that this should be exactly central and truly tapped; these conditions can be ensured by using the methods which I have described for engines of my own design.

No exact details are given of the

piston, but from other engine dimensions it is clear that this should be $\frac{5}{16}$ in. wide, and a groove $\frac{3}{16}$ in. wide $\times$ $\frac{1}{8}$ in. deep may be turned in it to take graphited packing. The rod is 5/32 in. dia., and the crankhead bearing, which is screwed to the upper end, must be split as shown in Fig. 8, to enable it to be assembled on the crankshaft.

The cylinder is mounted between the fixed portblock, *B*, and the pivot block, *C*, both of which are screwed to the base between the feet of the A-frames, and it is most essential that the centres of these should be dead in line and that the face of the block, *B*, is squarely located so that the portface of the cylinder beds truly against it while being quite free to swing when the pivot screw is properly adjusted.

This is perhaps a somewhat difficult condition to ensure, at least for the beginner, and I suggest that one method of doing so is to fix the blocks together temporarily by sweating, with an aligning dowel in the pivot holes (leave the tapping of the pivot block *pro tem*), and facing off the base surface by machining or filing exactly square with the face of the portblock. Even this, however, will be of no avail if the mounting surface of the base is not dead flat and true; it is also necessary to locate the two blocks correctly in relation to each other when they are screwed in position.

Aligning mandrel

To do this, an aligning mandrel is made from a dead straight piece of 5/32 in. silver-steel rod, long enough to extend across the base and pass through both blocks. After squaring up their positions, the portblock should be fixed first by its two screws and then the pivot block; in each case it will be possible to spot the positions of the tapping holes in the base from those in the blocks to avoid the risk of error.

Small clamps are useful for holding the parts in place during these operations and if not already available they should be made or obtained right away, as they will certainly be needed for innumerable subsequent jobs.

When fitted to complete satisfaction, the hole in the pivot block may be tapped and a locking screw fitted to the top (though I should personally consider that a locknut on the screw would be more satisfactory); the portblock is also equipped with a centre stud to fit the hole in the centre of the cylinder portface.

The crankshaft, *G*, may be either built up or machined from the solid; it is not necessary to give details of either method as they have been described on innumerable occasions in connection with other engines. I may observe, however, that this offers quite a good opportunity for the beginner to get some practice in marking out and machining an orthodox type of crankshaft from a piece of flat bar, which should be of about 1 in. $\times$ $\frac{3}{8}$ in. section.

I would, however, suggest a slight modification to this component, as drawn; it would appear that the only end location of the shaft is that provided by the flywheel on one side and the driving pulley on the other. I do not consider this to be very good practice, as although it serves its purpose, in the event of either fitting being shifted, accidentally or otherwise, it would be possible for the crankhead to be forced out of alignment.

A much better method would be to provide positive end location on the inside of the main bearings, either by enlarging the idle portion of the journals to form locating collars, or better still, extending the bearing surface inwards up to the webs of the crank. Incidentally, I do not understand why it should be necessary to place the bearing frames so far apart in this engine as it is a cardinal precept in any engine design to support a crankshaft as close up to the webs as possible.

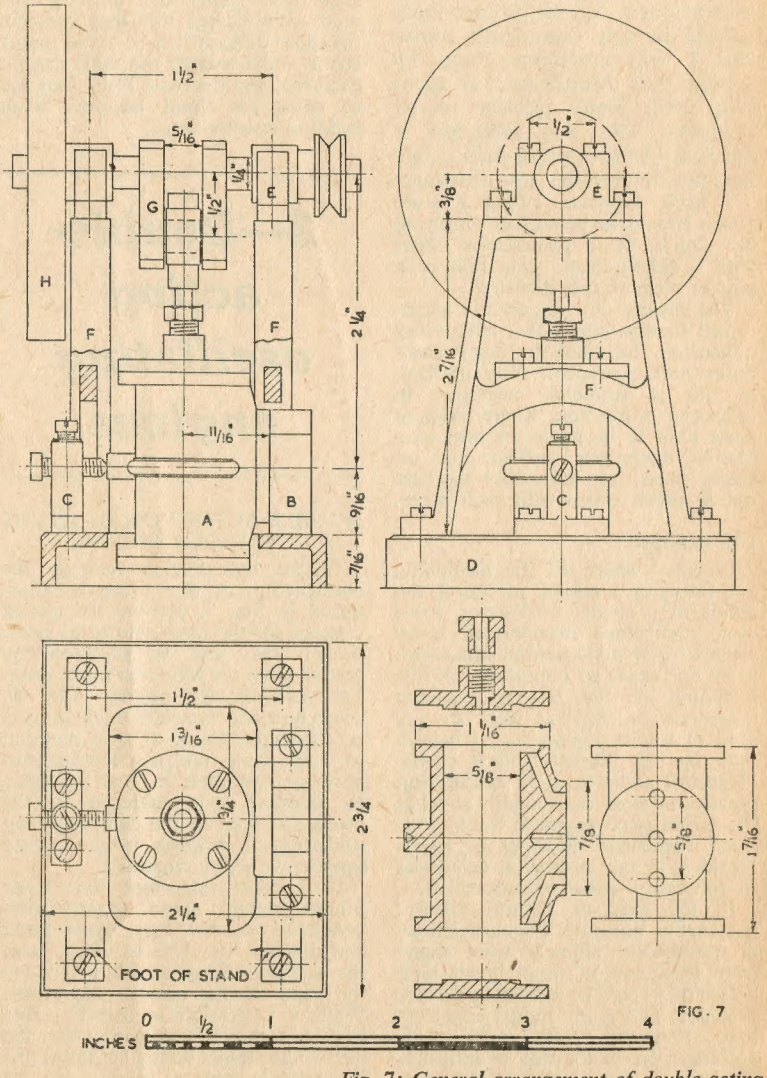


Fig. 7: General arrangement of double-acting oscillating engine, and details of cylinder

Extreme right, Fig. 8: Details of the split bearing for piston rod

Right, Fig. 9: Portblock, showing formation of the inlet and outlet passages on both sides (to suit the twin-cylinder engine)

Left, Fig. 10: Arrangement of complete plant with vertical boiler, showing cylinder portblock, reversing valve, etc.

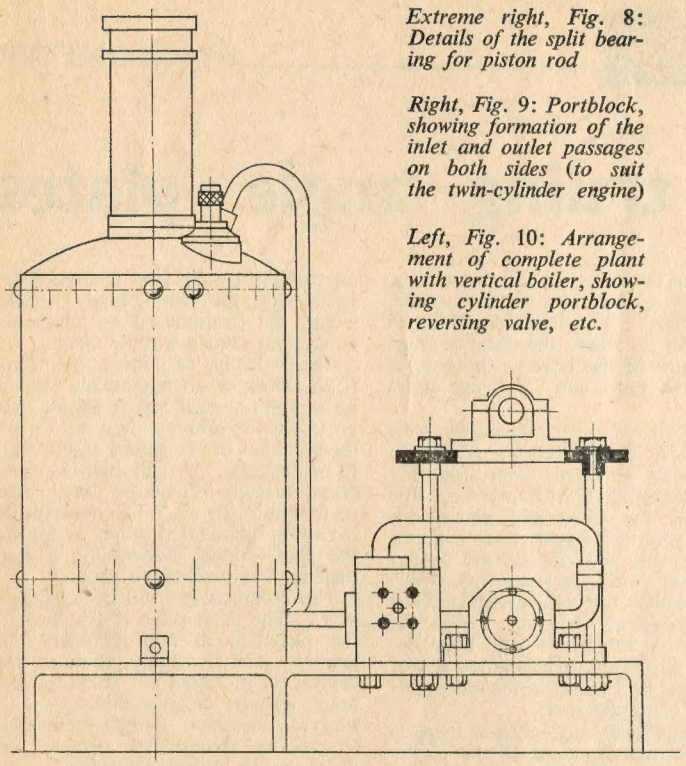


FIG. 10

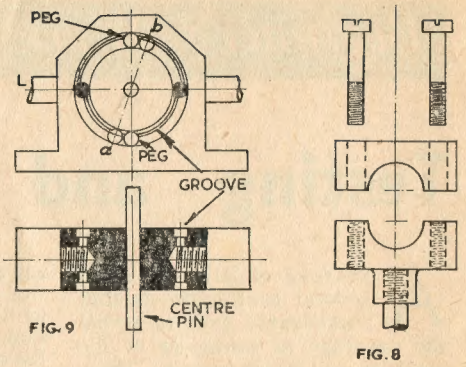


FIG. 9

FIG. 8

The main bearings, *E*, are of the plummer block type, and correct practice dictates that they should be split, though this is not a practical necessity in a small engine as solid bearings can be threaded on from the two ends of the crankshaft. They must, of course, be correctly aligned but this is easily ensured if they are made and fitted properly, and any small discrepancy which may cause the shaft to run tight when finally fitted can be corrected by running a reamer or lap through both bearings when they are screwed down *in situ*. (This, of course, pre-supposes that the shaft journals are properly machined or assembled in exact alignment).

CYLINDER PORT LOCATION

In drilling the steam ports in the cylinder and portblock, it is not practicable to use the simple method of ensuring their correct location recommended in the previous article, as the former ports do not lead directly into the cylinder but communicate with oblique ports drilled from the cylinder ends. It could, perhaps, be done by drilling straight-through holes and plugging them up afterwards, but there might be some risk of leakage with relatively inaccessible plugs.

The method of port formation recommended by Muncaster, however, is ingenious, and with careful measurement and marking out should give very satisfactory results. In this case, the cylinder ports are located by measurement, and an annular groove is formed in the fixed portblock, *B*, concentric with the pivot pin, and at the same radius as the two cylinder ports (Fig. 9).

At the top and bottom positions the groove is blocked or "stopped off" by fitting plugs, which are faced off flush with the face of the block; and at right angles to these positions, holes are drilled in the groove to communicate with the inlet and exit pipes, one of each thus serving for the two ends of the cylinder.

It will be seen that when the engine is assembled with the cylinder in contact with the block, and the piston on dead centre, both cylinder ports will be blanked off by the stop pegs; but when the crank is turned to swing the cylinder to its extreme angular position (indicated by the line, *ab*) the top cylinder port will be placed, via the annular groove, in communication with the right-hand horizontal passage, and the lower port with the left-hand passage.

At the other extreme end of the swing, the communications will be reversed; thus the conditions are established for admitting steam to each end of the cylinder in turn and releasing it to exhaust, on alternate strokes of the piston. As in the case of the single-acting engine, optimum timing is obtained when the "stop" of the groove lines up exactly with the cylinder port at dead centre and is exactly the same width as the port.

The ports in the cylinder and the oblique drilled passages should be $\frac{1}{8}$ in. dia., and the entry at the mouth of the cylinder in each case should be unobstructed, which calls for chamfering the edge of the cylinder and the spigot of the cover at this point. The portfaces should be carefully lapped and may with advantage be relieved in the centre as recommended for the previous engine. Thin paper gaskets should be fitted to the covers to ensure steam-tight joints.

A TWIN-CYLINDER ENGINE

The design of this engine may be adapted to form a twin or "double" engine by simple modifications and additions to the components. The base will, of course, have to be enlarged, and a third bearing support fitted to take a two-throw crank, with the crankpins located at 90 deg. as shown in the general arrangement drawing, Fig. 10, of a complete double-cylinder engine with vertical boiler, in elevation.

The drawing shows a modified form of bearing support, but most components are identical with those of the single engine. A double-sided portblock is fitted between the two cylinders with *both* its faces grooved and ported as shown in Fig. 9.

This drawing is admittedly somewhat sketchy and lacking in detail but it should be readily understood if considered in conjunction with the drawing of the single-cylinder arrangement (see Fig. 7).

Some further details of the twin-engined plant will be given in the next instalment.

● *To be continued.*

BY GEOMETER

Testing and truing angle plates

A FEATURE of lathe work—in general irrefutable—is that components tend to reveal the accuracy or otherwise of the machine and its equipment. Thus, the platform for components which an angle-plate provides when mounted on the faceplate must, of necessity, be in correct alignment with the lathe axis.

If the platform tilts so as to make an angle with the axis inaccuracy is clearly present, and a component machined on the plate will carry a similar error.

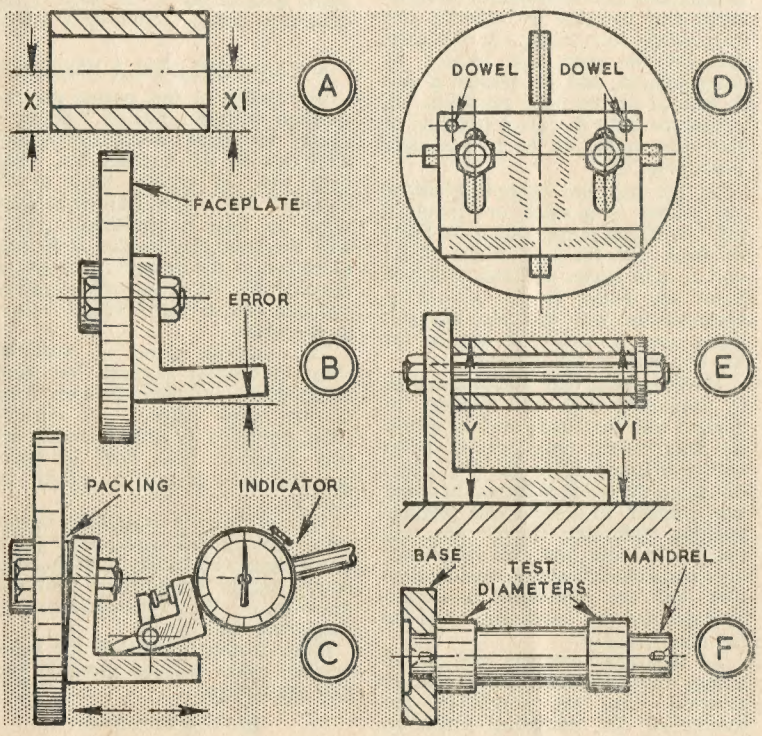
Given, however, that the angle-plate is true and mounted the correct distance from the axis, two important conditions of setting up are fulfilled. In confidence of the result, a component can be stood on the plate, positioned sideways, squared—perhaps from the front edge of the plate—and clamped. Any face machining will then be square on the component, while the axis of a bore will run parallel to its base. The latter condition is shown at *A*, where the distance from the centre of the bore to the base is the same each end, *X* being equal to *X*1.

This type of accuracy depending on alignment chiefly affects overall dimensions—and through them assembly of a component with others. For example, the bore and piston-rod-cover face of a small steam cylinder may be true; but if they are out of alignment with the base mounting-face, trouble will be experienced with the cross-head binding when the cylinder is attached to the bedplate. Again, flat-base bearings bored out of alignment will result in tilt and tightness of the crankshaft.

Faults mainly occur when there is an error in alignment of the angle-plate on the faceplate, as at *B*, since for practical purposes most faceplates are sufficiently flat and true-running. In any case, they can be easily checked—and the methods to be suggested counteract even a wobble error.

Theoretically, of course, the functional faces of an angle-plate should be at right-angles, but it should not be taken for granted they are unless the plate has been checked and proved to be accurate. Usually there is some error, though it may be small; and even should the error be considerable it can be eliminated when mounting the plate—which, incidentally, is often necessary in production shops.

The common method of testing is as *C*. The angle-plate is attached to the faceplate in approximately the position it will occupy, then an indicator is mounted on the topslide, for its plunger or lever attachment to bear on the plate. Saddle movement to and fro should then produce no difference in indicator reading.



Making corrections

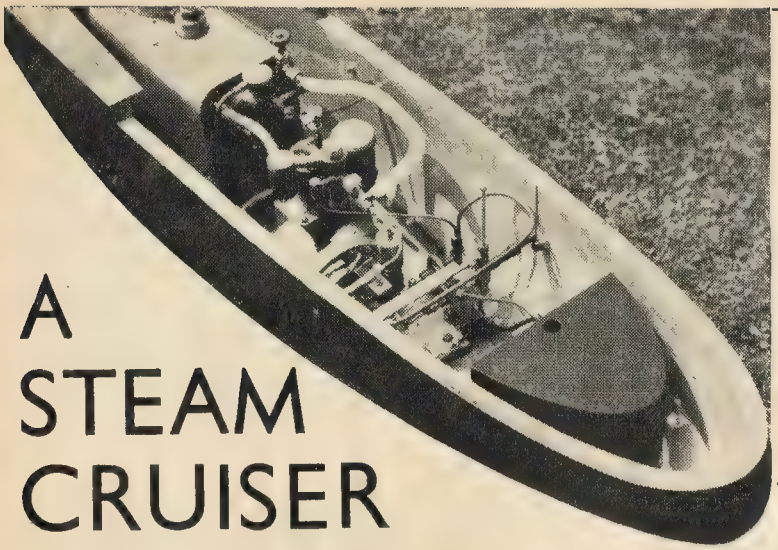
Tests should be made with the plate horizontal and in two vertical attitudes, near to and away from the operator, to search any error in spindle alignment, for which allowance could then be made. An error being present on the plate, as at *B*, packing is introduced, as at *C*, until a uniform reading obtains on the indicator.

On occasion a small cheap or home-made indicator will serve almost as well as a dial type, and with careful observation a bar or pointer will often suffice. Packing may be shim-stock or tinplate, or strips of paper.

Once trued in this manner—which also allows for faceplate wobble—the angle-plate can be finally adjusted for position; and if the job is to be a recurrent one, dowels can be fitted as at *D*, removing the faceplate from the spindle for drilling and reaming.

Tests of angle-plates alone, though less important than on the lathe, can be made on a surface plate, as at *E*. A parallel cylinder with a square end is clamped to the angle-plate, and checks at *Y*-*Y*1 with dial indicator or surface gauge should reveal the cylinder to be horizontal.

Instead of a cylinder, a steel mandrel can be turned, as at *F*, pressed into a base, then this is faced and the test diameters turned with the mandrel running between centres. ▣



A STEAM CRUISER

ANTHONY BEAUMONT tells how he built a sturdy model of a cruiser from materials accumulated in the workshop

General view of the engine installation before deck construction. Water supply tank is in the boat's stern

IN MAKING a 4 ft 6 in. tug, previously described in the MODEL ENGINEER, a number of hull-shaped $\frac{3}{4}$ in. obeche planks remained over from the bread-and-butter construction. From this wood, the 4 ft × 9$\frac{1}{2}$ in. freelance steam cruiser took shape, the final details of which have yet to be added.

I believe a more shapely and true-to-prototype hull results from the well-proven method of longitudinal sections as opposed to the plywood and frame method, in which it is difficult to provide enough room between the frames for a complete steam layout.

Well-seasoned wood of prime quality, in conjunction with Aerolite 306, takes some beating for a hull. In this hull the side thickness is about $\frac{1}{2}$ in. and only one cross bracing piece is needed.

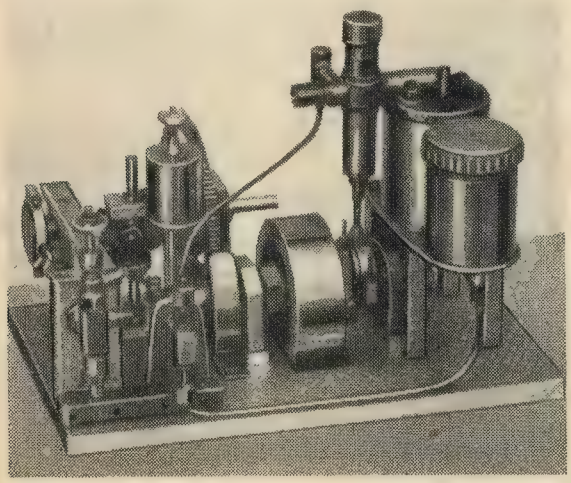
The deck work is sheet dural throughout, as a change from my usual brass and solder construction. Although the shapes are made with the minimum of curves, fabrication in dural by flanges and rivets is difficult enough, but it looks quite well when done, and expansion ripples are absent. Sheet metal of 18- and 20-gauge was used almost throughout and numerous small angle pieces joined the panels where long flanged joins were impracticable.

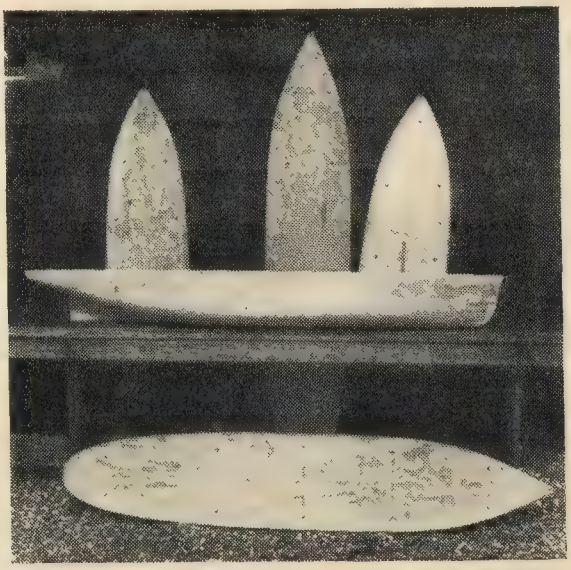
The after saloon has an internal partition, and a galley with sink, taps and electric cooker is included. The wheel house contains navigation instruments, clock and chart chest, while two small vents and a searchlight, all from dural rod, are attached to the upper deck. Deep scribe marks represent deck planking and make a fair job when all is painted and rubbed down.

The two large ventilators were made by the "lost wax" electro-

Right: *The hull in solid form before the sections were sawn out*

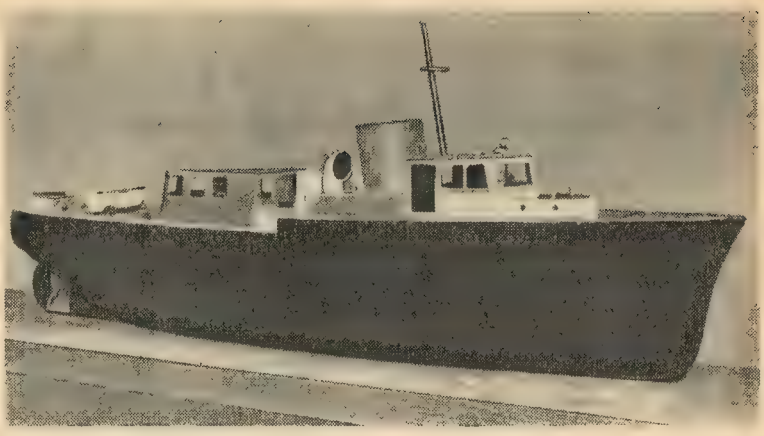
Below: *The single-acting piston-valve engine showing the layout of the pumps and gearing*

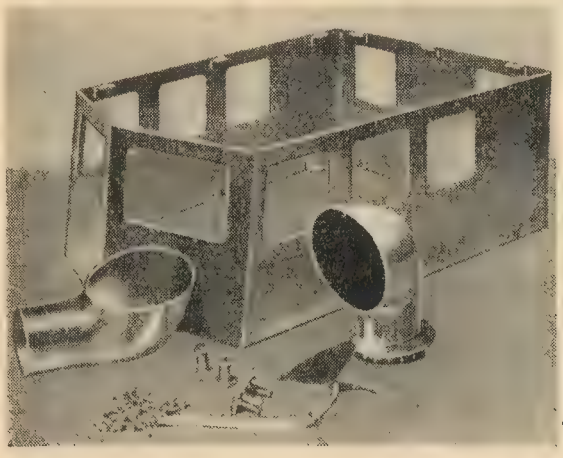




plating method, as described in MODEL ENGINEER in 1952. They are 2¼ in. overall and came out successfully although the process is lengthy. Cerrobend was used as the plating medium, and should be saved carefully (at 29s. per lb !).

The decks can be removed from most of the hull. The centre funnel casing lifts off, being rarely removed, while the rest is hinged in three pieces for attention to engine and blowlamp. Under running conditions the main stop-valve, pressure-gauge and pump bypass valve are accessible through the deck.

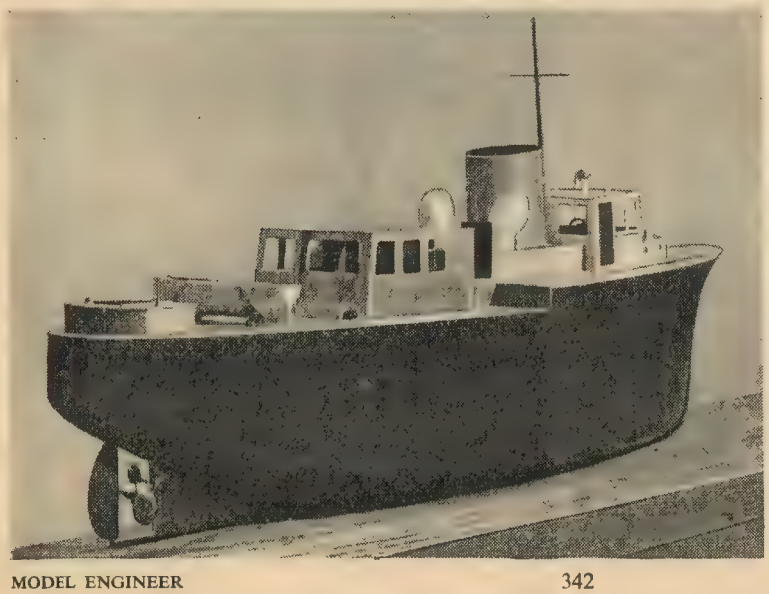




Above: The cruiser complete with decks. Rear dural deckhouse is unpainted

Centre: Deckhouse in dural, showing also vents, anchor and twin bollards

Below: View from the stern. Deck is flush aft, with sheer on the fo'c'sle deck



I regard the method of reaching the works as most important, and careful planning is essential if the boat is to be a really practical job.

The power plant consists of a single $\frac{13}{16}$ in. × $\frac{7}{8}$ in. single-acting piston-valve engine with water-tube boiler, and paraffin blowlamp. The engine in its original form was, I believe, called the Viking and was made up from purchased bronze castings some years ago.

A number of modifications were made to give more lasting qualities, namely lining the cylinder and valve with cast iron, fitting ball-races to the crankshaft and big end, replacing the solid eccentric strap by one of split stainless steel, and enclosing the crankcase to prevent general " mess."

The water and oil pump gearing is spur and worm drive giving ratios of 1 : 6 and 1 : 90. The general layout can be seen in the photographs. The usual minimum lift ball-valves are used in both pumps and give no trouble. A gravity feed oil supply ensures that the pump is always full.

Bearings for gear shafts are bronze bushed, pressed in fabricated dural housings, and the whole assembly is bolted to a $\frac{3}{8}$ in. thick aluminium base.

Initially a water filter and pump suction was fitted to take a supply from flotation water, but the idea was scrapped in favour of a two-pint internal tank of *clean* water. A fine adjustment screw-down valve bypasses surplus feed water to the tank.

A feed-water heater, attached to the hull side, uses exhaust condensate and is placed between the pump outlet and the boiler delivery valve. This is a help in keeping up steam against the pump feed.

Getting rid of oily exhaust condensate is a problem in boats of this type. One can either " save " it all and pump out by external means at

regular intervals, or put the whole through the hull side resulting in clouds of steam in the wrong place.

Leading the exhaust direct to the funnel uptake is hardly pleasant when bending over the boat, and moreover it spoils any decent paintwork on the decks.

As an experiment, only a very small steam and oil trap was placed on the engine exhaust. It has two exits and no draincocks. The upper pipe leads to the boiler casing and funnel, while the lower one serves the feed-water heater and carries a trace of oil and steam plus condensate. This mixture passes outboard by gravity, helped by the slight pressure in the steam trap.

The boiler shell is 2¼ in. × 7 in. and the bulk of the steam is generated in a nest of six ¼ in. inclined tubes passing into ⅜ in. cross pieces which are joined to the boiler shell at its lowest point by T-pieces.

The dome has steamways of many small holes through the shell which helps to stop priming. The main steam-pipe is formed into a super-heater loop before leaving the boiler casing.

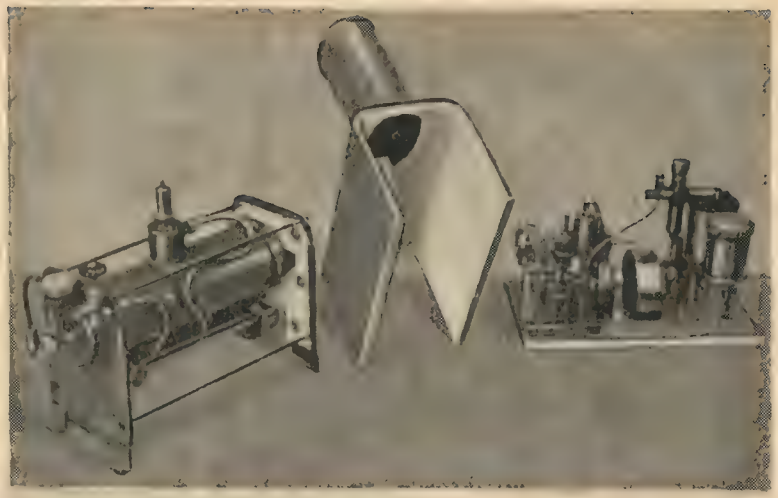
In addition to the pump delivery valve the boiler end carries a ¼ in. pressure-gauge and a small angle valve piped outside the hull for water level testing. In practice, this valve can be kept open very slightly. A water-gauge, although desirable, is almost impossible to fit in a visible position and has been omitted. Boiler and fittings are silver-soldered throughout.

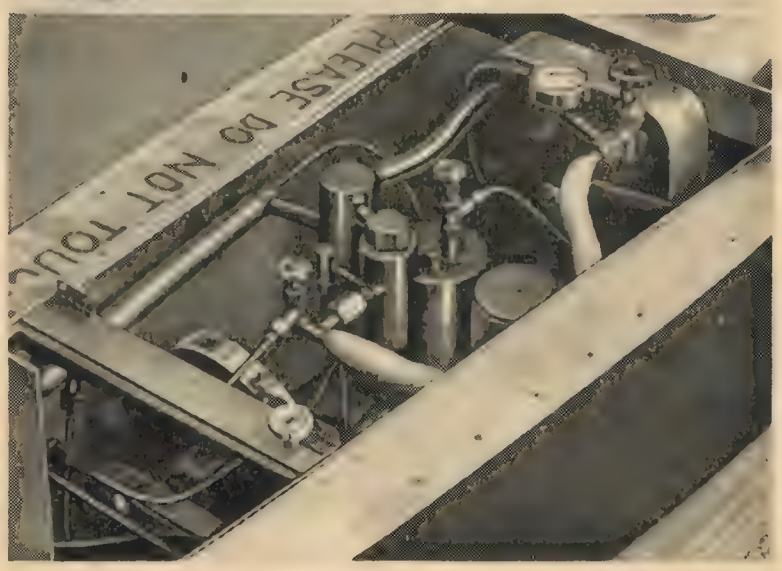
Bilge-water ejector

A later fitting in the engine room is a bilge-water ejector, consisting of a simple venturi jet for steam, blowing across a 5/32 in. vertical lift pipe. This takes steam from a small valve on the engine supply pipe and shifts about ½-pint in ¾ min. on a very moderate steam supply.

The blowlamp is a hybrid made up of a pre-war Bassett-Lowke cross-tube burner, an old painters' blowlamp fuel tank and pump arranged horizontally, while the valve to the burner is a scrap item from a hand-feed motorcycle lubricator. The pipe work is brazed and tank soldered with Comsol (high melting point soft solder).

A small brazed tray under the blowlamp flame tube holds the spirit for lighting thus giving the essential shelter from wind. ▣

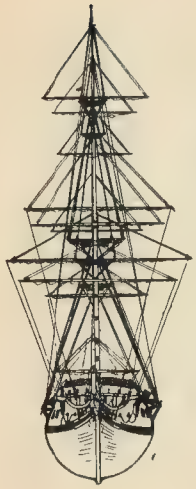




Top: Main components of the machinery in course of construction

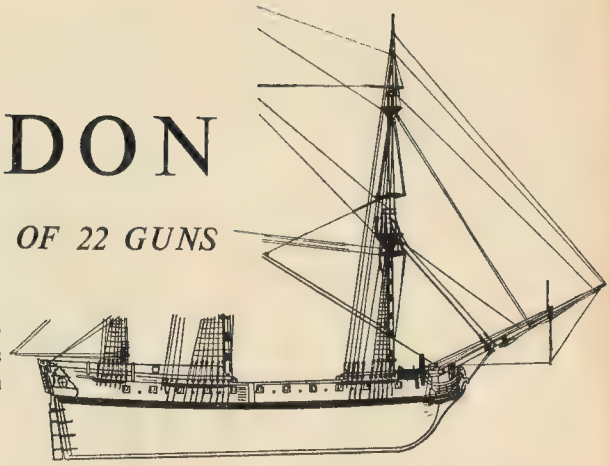
Centre: Copper ventilators are 2 in. high. C.Q.R. anchor and inclined brass double bollards

Bottom: The layout of the engine



MYRMIDON

A SHIP-RIGGED SLOOP OF 22 GUNS



R. J. COLLINS, in this third instalment, gets down to the serious business of the gun power of this late 18th century man o' war

(Continued from 7 February 1957, pages 191-194)

WITH THE OUTSIDE finished a start can be made on the inboard works. I have given an inner profile to use in conjunction with the deck plans. I suggest that all the fittings be made but not fastened until the last, otherwise the bits and pieces of the main deck may get broken while fitting up the fo'c'sle or quarterdeck.

The step of the bowsprit (Fig. 30) is combined with other timbers to make the sheet bitts of the foremast which rises above the fo'c'sle deck. This can be made in one piece but don't forget the bend in the middle. Centrally at the bottom is a square hole to take the bowsprit. At the bend it should be cut a little to take the fo'c'sle beam.

From thence it rises as two timbers 9 in. square, 3 ft 3 in. above the deck. A distance of 1 ft 6 in. above the deck on the after side is the bottom of the crosspiece. This is 5 ft 8 in. × 8 in. × 6 in., the 8 in. being the fore-and-aft measurement. The crosspiece lets into the uprights a little, not more than 2 in. Glue into position, both as a step and as bitts. When the glue has dried drive an iron bolt through the crosspiece into the upright, in other words, drill with a needle and use a headless pin.

Running aft from the step to the uprights of the riding bitts is a sort of extra reinforcement of the deck. The official profile shows this but the deck plan doesn't. However, I have put in what I think it looks like: 6 ft 6 in. wide × 4 in. thick.

On either side of the hole for the foremast, and also stretching from the step, are the horns of the forward bitts (Fig. 31). These bitts are different from the ordinary ones, having no cross-timber. The uprights are 3 ft 6 in. above the deck and 10 in. square. The horns are shaped and are 16 in. thick, the after ends being 10 in. square.

Rising between the horns and aft of the mast is the branching foot of the fore jeer bitts (Fig. 32). These open out, and above the fo'c'sle deck are similar to the sheet bitts already described.

Next comes the galley stove which is a squarish block, 4 ft 4 in. wide × 4 ft fore and aft. It is shaped for the fireplace in front and a boiler behind. The top is 4 ft above the deck, and above the grate it extends to the fo'c'sle deck where it takes the galley chimney. This will be described later.

On either side of the stove are the knees of the riding bitts (Fig. 34); 9 in. thick, they are 2 ft 2 in. at their highest. The uprights are 3 ft 9 in. high × 1 ft square.

Hatch coamings

The cross-timber, 9 ft 6 in. long and 1 ft 6 in. above the deck, actually consists of two pieces—there is the normal 1 ft square timber with another 6 in. layer fastened to its face. This piece gets cut up rather on the actual ship and is thus replaceable. If you use only one piece I should score it to show a division.

The next fittings on the way aft are the hatch coamings (Fig. 35). There are a number of these; some surrounding open hatches others with gratings. Across two of them the crosspieces of the formers can be seen.

In the first hatchway this is level with the forward edge and can be left, but I should cut it away where it actually crosses the second. They can be ignored where they cross the "grating" hatches. Paint all the visible parts beneath the openings with a matt black. If you like, the tops of the companionways can be shown.

The coamings are quite high, being 9 in. The athwart-ship ones taper from 7 in. thick at the bottom to 4 in. at the top, the fore-and-aft ones are 7 in. thick all the way but for a 3 in. recess which takes the gratings at the top. They must keep the camber of the deck, and the gratings, when used, must be flush with the top.

About midships are the next hatchways, one large one divided by a cross beam. The foremost part is the main companionway and has a double ladder going down in a forward direction. The after opening is the main hatch and should be covered with a grating. From the cross-beam which separates the two, rise two strutted iron posts which support the forward end of the main pump crank. I will deal with the pump as a whole in a moment.

The main sheet bitts (Fig. 36) are gallows bitts with the top of the upper crosspiece level with the quarterdeck. The uprights are 9 in. square for the first 2 ft 6 in. above the deck and from there taper to 6 in. square, which is also the size of the upper crosspiece. The lower crosspiece is 9 in. wide × 6 in. thick, let into the forward side of the uprights 1 ft 6 in. from the deck. Both pieces are 8 ft 6 in. long.

From the after coaming of the main hatch to the forward edge of the hatch abaft the mast is a further layer of reinforcement 3 in. thick × 4 ft 6 in. wide.

Just aft of the uprights of the sheet bitts are the lever pumps (Fig. 37). The wooden tube for these is not round but six-sided, 10 in. thick, 2 ft 8 in. high and with a 5 in. round hole drilled down the centre. From the upper edge of the rim rises a

forked iron bar (1 ft high) in which is pivoted the wooden arm of the pump, 3 ft long.

If you find it difficult to make the fork, two arms ending in an eye to take the bearings of the handle will do but the single fork is more correct. There is a thinner rod of iron from the inner end of the arm which passes down the pipe of the pump. In the centre of the reinforced deck is the hole for the main mast.

Then come the square heads of the chain pumps (Fig. 38). There are four of these, all 2 ft high and 1 ft square. The two outer ones are the upflow and are made of 2 in. planks, the two inner, the down pipes, are of 1 in. planks. As, in the model, they go no farther than the deck, I should just cut holes in the solid rather than build them.

Immediately aft of the chain pumps are the main jeer bitts (Fig. 39). The crosspiece faces aft and the uprights support one of the beams of the quarterdeck. Otherwise the dimensions are the same as for the sheet bitts.

Now comes another grating-covered hatchway, 5 ft 6 in. × 3 ft 8 in. Close against the after coamings is a pair of pillars reaching to the quarterdeck. On these pillars, as well as upon the extensions of the uprights of the sheet and jeer bitts, are the bearings of the chain pump crank. The shape of the crank is shown in Fig. 38.

Over the square pipes of the pumps are a pair of sprocket wheels, each consisting of a pair of wooden discs connected by iron rods. These wheels are 2 ft 2 in. dia. and 10 in. wide overall. I cannot see by the draught how many cross bars are needed but it looks to be about 10 or 12.

Over these wheels or drums pass the pump chains which have leather-padded wooden discs at about 6 ft intervals. I should not show more than two. Naturally I have described them as I think they were. You can make the drums from metal—most of the old models have them so—or build them up from card discs and cut-off pins. They should be painted black.

Still moving aft comes the companion way to the quarterdeck and then the lower portion of the capstan. The reinforced deck it stands upon is shaped and not square and is thicker forward to counteract the sheer of the deck. The shape and sizes can be seen from Fig. 40.

I have found the best way to make a capstan is to turn a part of it on the lathe. The spindle, drum (head) and the chocks between the whelps being turned as one piece and the whelps are cut to shape and inserted with the chocks trimmed to suit. If you haven't a lathe use a piece of suitable dowel for the spindle with the other parts cut from this wood and passed down over it.

The capstan is actually a double affair with the top one on the quarterdeck connected to the one beneath. In the prototype these could be disconnected at will. Whether you make two separate ones or one double is a matter of your personal choice. I don't think there is any advantage either way.

The guns

Further aft is the last of the companionways with a ladder going down.

To show the difficulties one encounters even in a comparatively straightforward ship like this, consider the guns. The earliest list gives 20 six-pounders and two 24-pounders on the gun deck with two 18-pounder carronades on the quarterdeck and the same on the fo'c'sle.

A second list changes the carronades to 12-pounders. A list of 1789 (supposed to be corrected to 1805) gives 20 six-pounders on the deck and two three-pounders on the quarterdeck. A list of 1804-10 changes the two three-pounders to the fo'c'sle.

If you measure up the deck plan you will see that the 24-pou nder, which would be at least 9 ft 6 in. overall, could only be placed to ports Nos 5 or 10 instead of what I feel should be the correct ports, No 1 where they could be used as chasers.

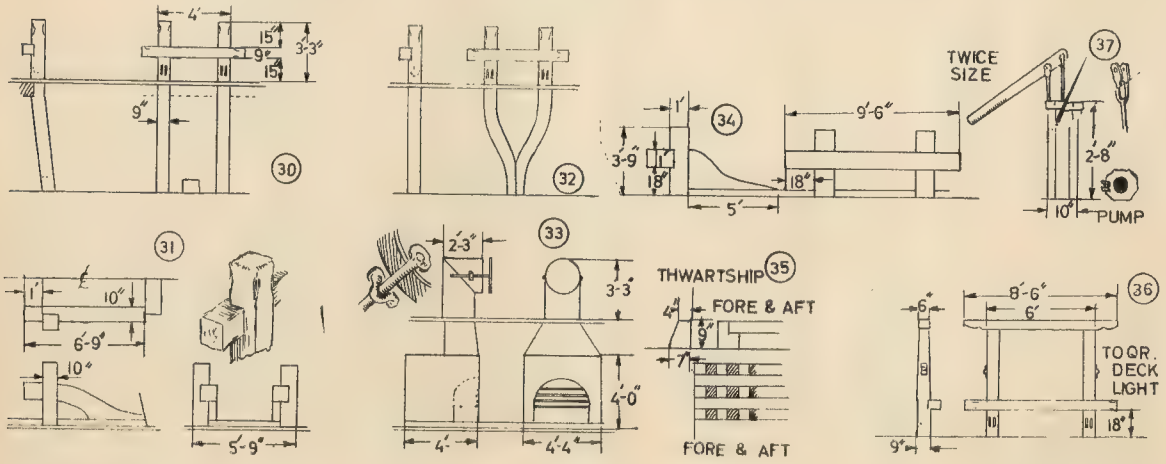
It was not usual to include carronades in the number of guns attributed to a ship until after 1815 but in correspondence with the National Maritime Museum at Greenwich, Mr Waite suggested the 24-pounder was a carronade and I am inclined to agree with him as I have found another early list giving a similar type of ship with 22 24-pounders and these, I feel, must have been carronades.

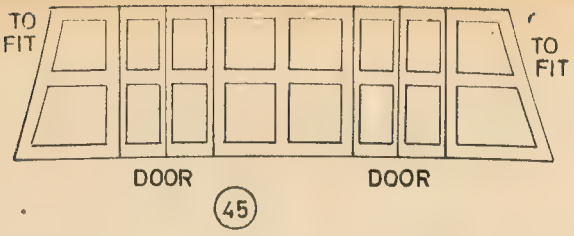
The guns and carronades would certainly be iron and if you turn them from brass they should be blackened. I am told that 1 oz. of copper nitrate dissolved in 3 oz. of water will achieve this result. I don't doubt it but I have not tried it myself.

Six-pounders varied in length from 6 ft to 8 ft 6 in., in 6 in. steps, each size being about 1 cwt heavier. I have decided on 7 ft guns as they appears about average. In the real thing they each weighed three quarters less than a ton.

Don't forget that the length of a gun did not include the cascable or pomelion. The bore was 3.7 in. which would make the muzzle (excluding the extra thickness of the ring) 7.2 in. and the breech 11.1 in. At this period the trunnions were still below the axis of the gun and were as usual the same diameter as the bore.

The question of breeching rings on the cascable still puzzles me. After 1800 there was certainly a ring on the upper part and some time later it entirely replaced the cascable. But when it came in the first place I have





been unable to find out. Someone must know.

The carriages are made from timber and the sides of cheeks are the same thickness as the bore, we can call it 3½ in. for convenience. The wheels (called trucks) were also the same thickness. The axles were of wood too. The idea behind this use of wood, apart from greater ease in repair, was that the wooden trucks did not damage the deck and the wooden axles slowed down the recoil by their friction. The sizes of all these parts are marked on the drawings (Fig. 41).

The carronade was a very different type of gun with a short barrel as it was only intended for close range fighting. It had a different type of mounting, being more or less fixed on a platform which was not mobile like the ordinary gun carriage. The front of the platform was held in position by a bolt through to the deck while the after part was supported on small wheels (like furniture castors) or skids which allowed the gun to be swung around pivoting on the forward bolt.

The elevation was controlled by a long screw which passed through the cascable. The trunnions were below the gun. I have records of two lengths, 3 ft 7½ in. and 3 ft, of which I have chosen the longer (Fig. 42).

As to the position occupied by the carronade I am again at a loss, but Mr Waite's further suggestion that it should be under the quarterdeck, the better to receive orders, seems to me a good one and I tentatively place it to port No 8.

Some little time after this date the almost slavish adherence to red for nearly all inboard works gave place to a freer choice, but I should play safe and make the carriages and platforms of the usual red.

Among the many details not shown on the official draught are the shot racks or garlands (Fig. 43). That they were known is proved by their presence in an earlier model. These racks were narrow strips of fairly heavy timber fastened to the inner bulwarks between the gun ports and having about a 6 in. clearance from the deck.

There were a number of depressions (or holes ?) in which the balls rested The diameter of the hole or top of the depression must have been a little smaller than that of the ball. In some ships there appear to have been similar racks around the hatches but I don't think I should put them on a small one like this. After all, this type of vessel was not intended to fight a long slogging action.

On each side, between ports Nos 3, 4, 5 and 6, are fixed heavy cleats (Fig. 44).

Now comes the last of the main deck fittings, the bulkhead (Fig. 45). This is a flimsy sort of affair with two pairs of doors. The draught shows no windows so I should put none.

It should not be any thicker than 2 in. and was probably built of panelled section. This thinness makes, in the model, the use of hinges rather difficult and I would be inclined to leave them out, fastening the doors in an open position. But that again is a matter for personal choice.

Moving forward to the fo'c'sle, I presume you are putting in all the beams, 10 of them, in which case I suggest you leave off a strip of the deck either side to show the furnishings of the main deck beneath. If you make the deck complete then it is a matter for you how many beams you use.

The camber of the fo'c'sle is flatter than that of the quarterdeck, being 4 in. at its widest. Make a template to this curve and shape the top of a piece of suitable wood to it. With a gauge cut off the beam. It should be 6 in. square, so cut a little full to allow for cleaning up. Shape up the top again as it will be a little ragged and cut the next, and so on.

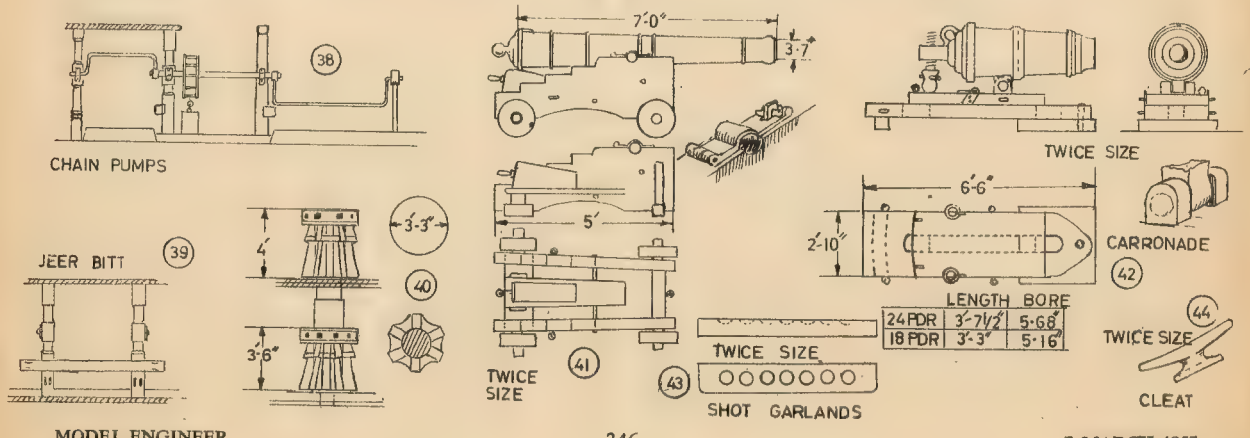
When they are in position put small pieces of wood between them above the clamps to hold them in place. Lay the deck, which must be of the same kind of wood as the main deck. Score the plank marks rather deeply (if you are not laying it as separate planks) as this will help to keep it to the camber. Mark and cut it for the fittings but don't fasten it down until you have fixed the bits and pieces beneath.

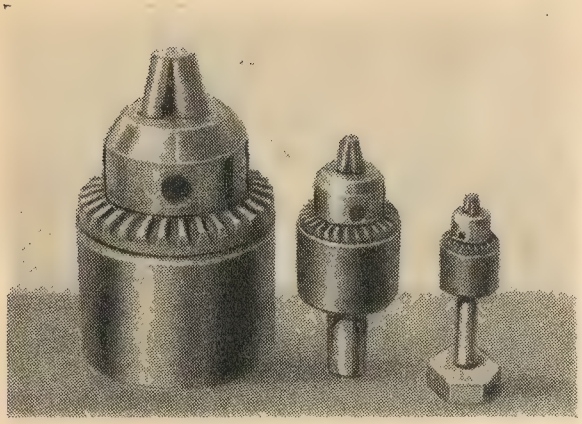
Coming at an angle across the deck are the cat-head beams, already described and which I should paint black. Then comes the top portion of the sheet and jeer bitts which should also be black. Aft of these are three openings in the deck. The first is a grating, flush with the deck, 3 ft 9 in. × 2 ft 9 in. overall.

The central opening is for the galley chimney which rises 3 ft 3 in. above the deck. It is quite large, 2 ft dia., and turns to right angles with a measurement of 2 ft 6 in. along its top. On either side of the opening and slightly above its axis is a small eye through which passes the arm of the shutter. This is a metal disc slightly larger than the diameter of the chimney. The whole of it should be made of thin metal standing on a metal plate 2 ft 8 in. square.

The third opening is a smaller grating 2 ft 3 in. square.

● *To be continued.*





A commercial ½ in. drill chuck compared with the author's two miniature chucks

Making a precision drill chuck

Here is an excellent exercise for the skilled engineer who needs a holiday from repetition work

By A. A. SHERWOOD

IN MY OPINION the Jacobs pattern drill chuck is a supreme example of elegant design. It has become so popular in the workshops that one rarely finds any other type of chuck used for holding small drills, etc., on general purpose machines.

These chucks are often abused with the harsh treatment that seems the lot of many mass-produced articles, with little ill effect on their gripping or self-centring properties. It is a sad fact that the normal scroll chuck used on the lathe is not so hardy.

After finding out how to dismantle a Jacobs chuck many years ago I was seized with the desire to make one, at first just for the fun of solving the very unusual problems of manufacture that this design presents. This desire was fulfilled about a year ago, and the following account gives details of the solution.

DESIGN MODIFICATIONS

Fig. 1 shows, to scale, the general assembly of the model. The general proportions are the same as the standard 0-½ in. commercial chuck, which may be classed as a light-duty pattern.

Modifications have been made, some occasioned by the fact that this model has a capacity of 0-⅛ in., and others to enable the machining to be done without special purpose machine tools. It is not, therefore, a true scale model. There are no such things as true scale models; the nearest are those in glass cases in museums, and they will not usually work satisfactorily.

Even here, one cannot scale the particle size of metals, nor paint film thickness. But that subject could be debated for hours and is not relevant to this article.

The modifications made refer to the 0-¼ in. chuck, which I shall call the prototype, and are as follow:

1. The nut has been increased in length axially.
2. The threads on the jaws are almost of Acme form, instead of buttress form as in the prototype. My method of threading the jaws and nut would have caused interference in the buttress thread and led to hard bearing on the edges of the jaw teeth and liability to chipping. The jaw threads are coarser than scale (25 t.p.i. against scale 32 t.p.i.) —quite a normal condition for models in general.
3. Jaw passages drilled right through the body, instead of blind as in the prototype; for obvious reasons.

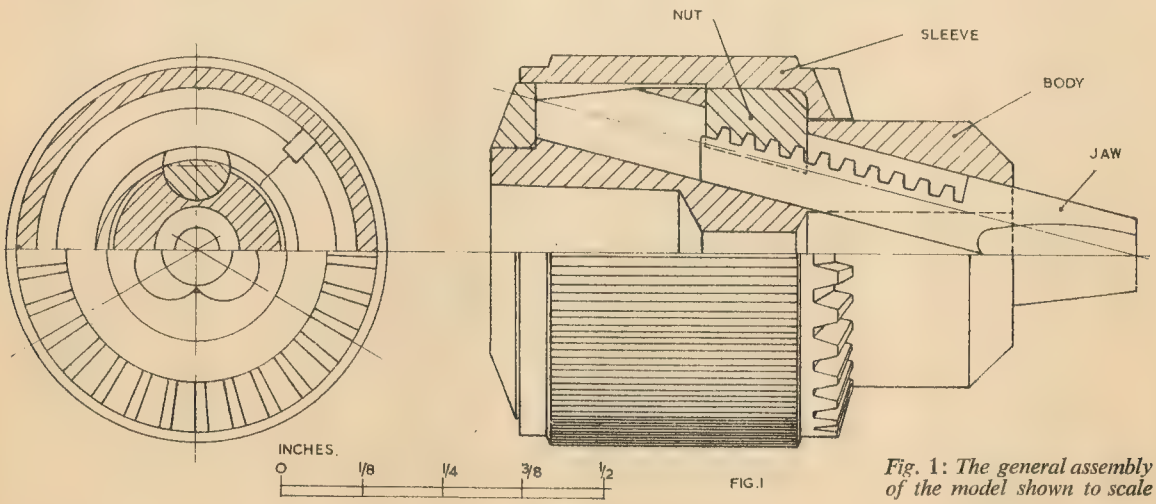


Fig. 1: The general assembly of the model shown to scale

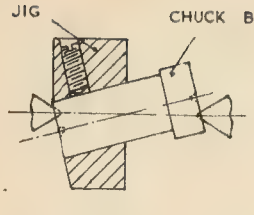


FIG. 2

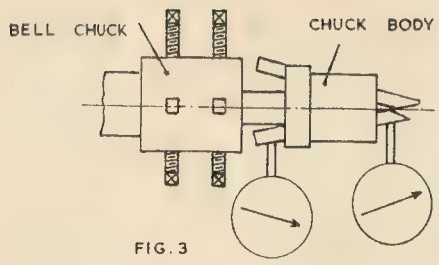


FIG. 3

Fig. 3: *Using two dial gauges in association with a bell chuck*

4. Thirty teeth on the outer sleeve. The prototype has 31, i.e. one hunting tooth to even out wear on key and sleeve.

CHUCK BODY

A steel disc, $\frac{9}{16}$ in. dia. and 1 in. long, was set up concentrically in the lathe chuck and two sets of centre holes were drilled in the periphery, dividing on the headstock and drilling with the spindle on the cross-slide. The axes of these pairs of centre holes were 14 deg. 12 min. inclined, i.e. the cone angle of the required jaw passages.

The body was turned to $\frac{1}{2}$ in. dia. over most of its length on one pair of centre holes. A jig was then made from a piece of mild steel $1\frac{1}{4}$ in. dia. $\times$ $\frac{3}{4}$ in. long. A hole $\frac{1}{2}$ in. dia. was drilled and reamed right through at *about* $14\frac{1}{2}$ deg. to the axis.

The jig was placed on the chuck body and its exterior turned on the offset centres in the chuck body blank (see Fig. 2). The jig was set up with its outer surface concentric in the lathe chuck and the body blank held in this jig while jaw passages were drilled from the tailstock.

The body blank was indexed by three scribed lines at 120 deg. marked on it previously. By this method, the jaw passages were started at the large end of the body, thus avoiding having to start the drill on an interrupted cut, which would occur if the passages had been drilled from the small end.

As soon as the drill started to break into the other jaw passages at the small end it was replaced by a drill ground "square" at the end to avoid wander. Each jaw passage was finished with a D-bit.

This whole procedure may sound rather long-winded, but it was based on the requirement that the three-jaw passages *must* intersect on their centre lines at one point. This is the main essential; the cone angle is not critical, nor is the accuracy of indexing jaws at 120 deg. apart.

The next operation is undoubtedly the most critical of all. There will probably be a little drill wander; but the effect of this can be minimised by setting up the body blank concentric with respect to the jaw passages. This was done by drilling the taper socket hole considerably undersize and soldering in a short stub of steel rod. This rod was gripped in the bell chuck.

The bell chuck is not often mentioned nowadays, which is a pity, because it can be adjusted to correct for swash and eccentricity as well. The normal four-jaw chuck cannot—unless we allow for swash correction with a hammer blow parallel to the axis !

Calculating cone angle

Three close-fitting rods were put into the jaw passages and allowed to project at each end. Using a dial gauge, the bell chuck screws were adjusted to give the same gauge reading on each projecting rod at each end of the body blank (Fig. 3). This last sentence describes two or three hours' work, and the method used would supply enough material for another complete article.

When the body was set up as accurately as possible (to about 0.0001 in. concentricity, in this case) the cone angle was calculated from the dial gauge readings. It came out to 14 deg. 7 min.; i.e. 5 min. arc lost in the various operations. Assuming that drill wander is responsible for all of this, it amounts to a wander of about 0.001 in. in the length of the chuck body. Small, but very detrimental to the final performance if not corrected.

The body blank was finish-turned all over at this setting, and the three key holes were drilled with the tool-post spindle. Then the backplate to cover the open ends of the jaw passages was pressed on and the taper socket bored with the body gripped in a turned brass bush.

THE NUT

In the chuck being described, the jaws were made before the nut. This was later discovered to be undesirable so the account will continue in the best order, which was actually used in the manufacture of another chuck.

Basically, the nut is just a disc of metal with a tapered Acme thread in it. To produce this, a makeshift taper turning arrangement (Fig. 4) was fitted to the lathe with a one-way action; i.e. the pressure on the screwcutting tool could have pushed the cross-slide out of contact with the guide bar.

This did not occur as the cuts were very light; but even if it had done so it would have been better than a system permitting the opposite effect, i.e. a "dig in." The tool used was a 25 t.p.i. Acme chaser; but due to the cone angle the change wheels should have been set up for 25.78 t.p.i. The best I could get was 25.71 t.p.i. using a 20/40, 35/45 train with a 10 t.p.i. leadscrew.

Since the nut has only about four threads, the cumulative error is less than 0.001 in., hence the error in concentricity of the chuck due to this would not exceed 0.00025 in. (i.e. 0.001 in. $\times$ tan 14 deg. 7 min.) and is, in fact, unlikely to attain even half that amount.

The nut was made considerably over length and the right portion of the cone was obtained by facing off metal from each end. In this way the screwcutting operation was simplified, as the diameter was not critical at that stage. Then the nut was sawn

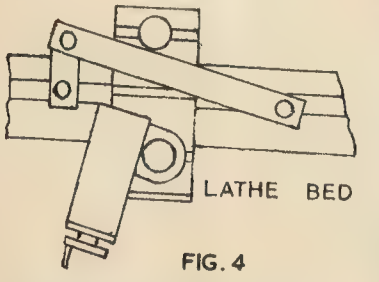


FIG. 4

Fig. 4: *Makeshift taper turning arrangement with one-way action*

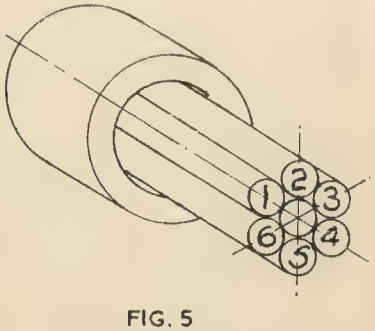


FIG. 5

Fig. 5: *Showing how seven bars of equal diameter will nest together*

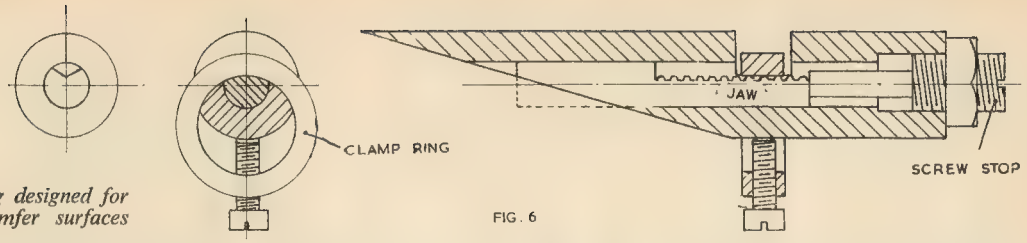


Fig. 6: The jig designed for filing the chamfer surfaces

about half-way through at positions diametrically opposite, and hardened right out.

The next operation was to break it in two, which was done by holding the lower half in the vice, with the saw cuts just above the jaws, and clamping the top half in parallel clamps. A gradually increasing force was applied to the clamp until the two halves separated. The nut was then tempered.

This method of obtaining a split nut may shock the uninitiated, but it works and is used in manufacturing commercial chucks. Provided the nut is dead hard when broken the two parts will register accurately on their broken surfaces, as the distortion is negligible. It is difficult to think out an alternative solution which would give such a perfect register for the threads.

THE JAWS

The method used for threading the jaws gives automatically two sets, with the threads correctly phased; useful if one set gets spoiled in subsequent operations.

It is well known that seven rods of equal diameter will nest together in perfect contact with one in the middle and six on the outside. This nest of rods was sweated together with soft solder and the assembly screwcut as if it were one solid bar. Having made the nut first, it is a simple matter to assemble the nut into the chuck body and measure the depth of jaw under the thread for good fitting.

Of course, it is implied that the nut is first made as closely as possible to the required dimensions, then the measurement taken should not deviate much from design figures and can be allowed for by slight modification of the jaws. But if the jaws are made first, it is a much more difficult job to take the necessary measurements for correction of the nut and still more difficult to ensure that the nut complies with the corrected measurements until it is hardened and split. Then, if it doesn't, a new one has to be made.

The jaws were screwcut 25 t.p.i. Acme form, and melted apart, Nos 1, 3 and 5 forming one set and Nos 2, 4 and 6 the other (Fig. 5).

The chamfering of the gripping ends of the jaws is a tedious operation and involves a nice little problem in solid geometry. A filing jig (Fig. 6) was made for this purpose, with the chamfer surfaces milled to calculated angles, and hardened. The jaw was located endwise by an adjustable screw stop in the jig, and angular location was obtained by a clamp ring bearing on the crest of the threads.

Each jaw was chamfered to the same setting and assembled in the chuck body at maximum opening (i.e. with the nut bearing on the shoulder at the end of the thread) and the size of the opening was measured. The jig was reset by trial and error until this opening was 0.12 in. dia.

At this stage the chamfered surfaces on the jaws met in a sharp edge. This sharp edge was removed, a ring clamp made to hold the split nut together, and the chuck was assembled. A stub of steel $\frac{1}{8}$ in. dia. was skimmed down to 0.12 in. dia. and the chuck tightened on to this stub (Fig. 7). The concentricity of the body of the chuck was checked at each end by a dial gauge. This procedure was repeated with stubs down to about 0.03 in. dia., and all the dial gauge readings were analysed. Approximate corrections were made by filing the jaws and then the jaws were hardened and tempered.

The test procedure was repeated with the hardened jaws and corrections were made with an oilstone. In this way, the chuck was made to grip concentric to about 0.0005 in. over the whole range; the residual errors appearing to be quite random (i.e. not due to such things as drunken threads on the nut and lack of squareness of thrust faces).

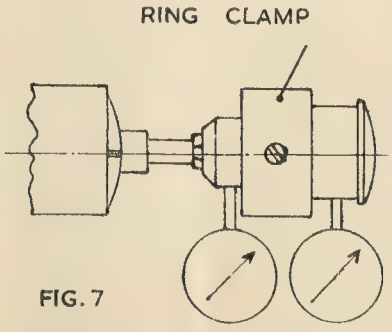


Fig. 7: The set-up for testing and correcting the chuck's concentricity

THE SLEEVE

This was a simple job, apart from tooth cutting, knurling and lapping. The teeth are straight-sided and cut with a flycutter; not exactly good bevel teeth, but generated teeth are too much of a luxury for this application.

The knurling consists of 120 grooves planed parallel to the axis; the non-slip surface so formed is preferable to ordinary knurling, although rather more time, consuming. The sleeve was hardened and tempered, and the contact surface with the nut lapped to a good press fit.

It appears that a good circular interior to the sleeve is desirable to give a little correction to the nut, which is circular when turned but may distort on hardening—hence the lapping operation on the sleeve. The best one can hope is that the distortion of the nut is about halved by this refinement. It also follows that it is best not to grind or lap the outer surface of the nut, or the effect is lost.

Finishing touches

The chuck was assembled and mounted by its taper socket on a true running arbor. The concentricity of rods gripped in the chuck was then tested over the whole range. The results showed that the taper socket could be improved; this was done by boring out with the chuck gripped on a true running 0.1 in. dia. stub mandrel held in the lathe chuck.

On final test, with the chuck mounted on its own taper socket, drills from 0.02 in. to 0.10 in. dia. were held concentric to 0.0004 in., i.e. a *total* dial gauge movement of 0.0008 in. At maximum opening (0.125 in. dia.) the error suddenly increased to 0.0005 in., probably due to the fact that the recess at the end of the jaw threads reduces slightly the effective number of engaged threads when fully open.

When fully open, the capacity is about 0.002 in. over the $\frac{1}{8}$ in. nominal. The key, which has not been considered worth recording in detail, has 11 teeth of the same form as the sleeve. Again, not a particularly good bevel gear—but have a look at some of the commercial chuck keys! ■

CLUB RATES

THE KEY TO SECTION EIGHT

JOSEPH MARTIN keeps you abreast with the latest developments under the Valuation Act

IS THERE anywhere in the model engineering movement a "cheap, capable and tame lawyer-member" willing to fight a test case that would clarify beyond all doubt the position of the clubs under Section Eight of the 1956 Rating and Valuation Act?

The question comes from secretary G. J. Clark of Hitchin and District M.E.C. I have no doubt that it is echoed by other clubs, but whether any of them would share the expense of bringing a test case, not necessarily from Hitchin, no one can say until at least one of these clubs shows itself willing to consider a definite move.

Hitchin's own case seems to be unusual in the terms of tenancy and the facilities which the club possesses, whereas a number of clubs acting together to obtain a decision for all would prefer to offer a typical case rather than one whose circumstances were possibly unique. This is clearly understood by the members themselves and they are, therefore, concentrating at present on two other lines of action —while keeping a hopeful eye turned, I believe, towards a certain solicitor who is said to be showing a benevolent interest in the case.

M.P. approached

In the House of Commons, Hitchin is represented by Mr Martin Madden, and to him the club has sent a clear and eloquent statement pointing out that the difficulties of finance are completely overshadowing its basic purpose of encouraging model engineering, and hoping for a more favourable and liberal view of "social welfare."

Mr Madden is a very active and conscientious M.P. who some time ago put up a Private Member's Bill. I am sure that he feels deeply sympathetic towards the Hitchin club, an acknowledged asset to that part of Hertfordshire. On the other hand every constituency has various groups which think that their separate and special claims should be pressed in high places, and there is more than one group in Hitchin Division with a grievance under the Rating Act.

Were model engineering the only activity to be excluded from the privileges of Section Eight the matter would be considerably different and an M.P. or lawyer could confidently point to an accidental case of injustice. But in fact the clubs are very far from being alone and may even be a minority among the excluded—as they were in one of the London boroughs where I made inquiries.

Hitchin's other line of action is an appeal against the actual valuation of the premises—an appeal that must be made by the owner of the property. This course has been taken in the Midlands by Birmingham S.M.E., and I hear that Fred Haynes of Manchester (3 Cherwell Street, Manchester 11), one of the liveliest spirits in the movement, has been rousing the fighting cocks of the North.

Birmingham's success

But wait: I already have good news. Birmingham reports success, though not from the appeal tribunal. Late in January the society heard from the land valuers handling its claim that the Inland Revenue had agreed to reduce the rateable value of its premises from £190 to £120. This is a considerable reduction, although the new figure still represents four times the old rating. It shows what can be done sometimes by negotiation.

"We thought," writes public relations officer W. Finch (17, Sandgate Road, Hall Green, Birmingham 28), "that there may be other societies in a similar position to ourselves regarding the new assessments, and this news may give them a new ray of hope. While there are no short cuts or guarantees, our advice to other clubs is to engage the best estate and land valuer they can afford, put all the facts before him, stress the educational value, and hope for the best."

Excellent! But what are most of the other affected societies doing? Just hoping? When the Hitchin club issued a general appeal through these pages the only direct answer to reach MODEL ENGINEER came from Salisbury. I now have further news from this energetic society in the West.

Those who read my article on Clubs and Rates in MODEL ENGINEER of November 22 may remember that the Salisbury society, which regarded its assessment as reasonable, first made a claim for relief under Section Eight and then, the claim having been turned down with no explanation given, wrote to the Council for Social Service and also asked the advice of a solicitor. Both the Council for Social Service and the lawyer were of opinion that the society came under that all-important section.

I have since been told by secretary R. A. Read of the Southern Federation of Model Engineers that the Salisbury society's second application, made through their solicitors, has been turned down by the City Council, again without a stated reason.

After consideration, Mr Read found himself agreeing with an opinion expressed by the editor of MODEL ENGINEER at the annual conference of Model Engineering Affiliations and Federations (during the M.E. Exhibition). That is to say, he came to the conclusion that it would be no use writing to the Chief Valuation Officer as this official is not empowered to give "sympathetic assessments" and is not concerned with relief under Section Eight.

Contacted Minister

But Mr Read was determined to go further. So he wrote to the Minister of Housing and Local Government, who at that time was Mr Duncan Sandys. The Minister replied that, while he had no power to interpret the Statutes, he would note the society's views and take them into account if any amendment of Section Eight were undertaken; and he also said that local authority associations had circulated their members on the interpretation of Section Eight.

But when Mr Read approached the Association of Municipal Corporations, the A.M.C. in explaining that it could act only on representations from its members denied that it had been given any interpretation of the Act!

On all levels of government, contradictory statements are more or less to be expected and I doubt if Mr Read felt any great surprise. At any rate the Southern Federation is backing him bravely with three interesting suggestions.

The first of the three is that he should write to the Central Council for Physical Education whose far from nominal patron, as everyone knows, is the Duke of Edinburgh. This idea will strike many as novel and perhaps odd; but the Federation understands that the C.C.P.R. concerns itself with indoor recreation, including model engineering, as well as with the outdoor activities that it encourages through its excellent work

in providing funds for playing fields.

The Federation is right. To make absolutely sure I checked at the Central Council's headquarters—6, Bedford Square, London, W.C.1. I may add that no one in high places is likely to be more sympathetic to model engineering than the Duke of Edinburgh, who opened the M.E. Exhibition in 1952.

It was the Federation's second suggestion that if it were necessary to fight a test case, obtain counsel's opinion, or apply for a statement of a case in the High Court, a fighting fund should be opened; for obviously an action of this kind costs money. The third suggestion followed as a corollary; that the views of other federations, affiliations and model engineering societies be invited, and that MODEL ENGINEER be asked to make this known.

"The Hitchin Club," writes Mr Read, in replying to my November article, "have apparently gone forward on their own, for which we are grateful, but it does seem that the time has come for all model engineering societies to get together and do something on a national basis if it is thought desirable."

"Get together"

Mr Read adds that he is willing for the time being to act as a receiving point for all suggestions and evidence which may be useful to the cause—such as details of schools with model engineering in their curricula—as mentioned in the last paragraph of my earlier article—and news of local authorities which have given help to model engineering societies or run model engineering classes, so that if it is decided to take the matter to court counsel may be able to make out a good case.

And then he asks the same question as Mr Clark of Hitchin: is there anyone connected with the legal profession in the model engineering movement who would be willing to help?

If the fight is pursued on educational grounds Salisbury may possibly be in a better position than Hitchin as it already has a strong junior section, whereas the junior section at Hitchin is just showing signs of growth. But what are the hopes of succeeding on these grounds or on the more general grounds of social service?

That is the question that we have to answer; and so I will quote from the most enlightening document so far made known in this discussion, the letter sent by Mr W. Wilson, clerk to Hitchin U.D.C. to the Hitchin club when that club asked the council treasurer whether Section Eight applied to its premises in Grove Road.

"Section Eight of the Act," wrote Mr Wilson, "applies to a hereditament occupied for the purposes of an organisation which is not established or conducted for profit and whose objects are charitable or are otherwise concerned with the advancement of religion, education or social welfare.

Defining social welfare

"The expression 'social welfare' is not defined in the Act, and because of the doubt which existed among local authorities as to the meaning of this term, the Associations of Local Authorities held a joint meeting with a view to giving information and guidance on some of the general principles which might be involved when deciding whether any particular organisations came within Section Eight. As a result of this meeting, local authorities were advised that model engineering clubs did not come within the provisions of Section Eight of the Act.

"This advice appears to be based on the view that an organisation is not one whose main objects are concerned with the advancement of social welfare unless it has as its main aim a public benefit. Counsel has advised that the adjective 'social' in the phrase 'social welfare' connotes an intention to confer a benefit beyond the personal benefit of those persons who avail themselves of the facilities or advantages offered by the organisation.

"It is said that the underlying concept is to help those who, by virtue of youth, age, financial circumstances, physical or mental disabilities, or other hampering causes, need assistance to enable them to obtain advantages which others, more favourably placed, enjoy without help. Additionally it is stated that the benefit conferred by any particular organisation would be 'public' if it aimed either at benefiting the public generally or the public in a specific locality, or a section of the community sufficiently wide to give the object a public character.

"The council considered in the light of the advice received, but as they were sympathetically disposed to apply Section Eight to the hereditament occupied by the model engineering club, asked me to seek a further opinion of counsel with regard to the occupation of the premises in Grove Road.

"Counsel has replied that he cannot agree that the model engineering club are within the ambit of Section Eight of the Act of 1955 as the principal object of your organisation appears to be to give pleasure to the members and their friends, and not to be primarily educational or concerned with social welfare.

"In view of this further advice, which confirms that originally received, the council very much regret that they are unable to apply Section Eight to the premises in Grove Road."

If this letter disappoints, it also pleases; for here we have a council alert to the value of the model engineering movement in its community, and a busy council clerk who has the spirit to challenge a decision made at the centre.

The knowledge that other local societies have also fared badly does not (to quote Mr Clark) "make the rent and rates easier to find." On the other hand, it is important, as I pointed out in November, to keep this knowledge in mind and to realise that the Act must have been framed with a full knowledge of its consequences in every locality.

What of others?

I would indeed suggest that the interested societies should obtain not only the views of their fellow modelling organisations, but also the relevant details relating to other organisations which are affected by the Act. One of them, for instance, is Hitchin Cricket Club. Yet a certain bowling club (never mind where) is allowed the benefits of Section Eight!

Apparent discrepancies such as this may prove a very useful pointer. It may be argued that a cricket club fulfils a more "public" function than a model engineering club whose activities (again let us be honest with ourselves) are in the main intended for its own members. If, therefore, the cricket clubs, with their large followings and their conspicuous place in the local framework, are excluded from the vital section, the prospect of relief for modelling clubs would seem too remote to be considered.

But one small item of information—the fact that a bowling club is exempt—changes the picture considerably. Surely bowling is a far less "public" activity than cricket?

If anything we should expect the opposite: that a cricket club had a stronger claim to Section Eight than a bowling club.

Here is a chink that lets in some light. After appearing to insist on the "main object," the Act (in a manner typical of official regulations) seems to expand in a kind of postscript. "Additionally," says Mr Wilson, "it is stated that the benefit conferred by any particular organisation would be 'public' if it aimed at benefiting the public generally, or the public in a specific locality, or a section of the community sufficiently wide to give the object a public character."

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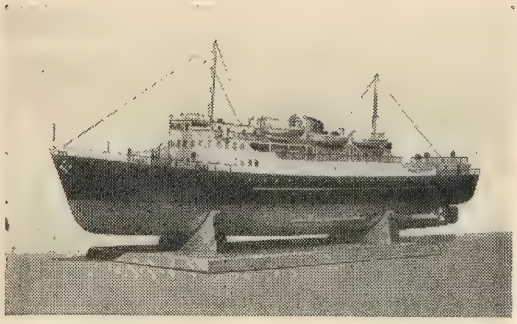


A WORKING MODEL OF ST NINIAN

By EDWARD BOWNESS

The fifth article in this series deals with hull stiffening and the provisions for installing radio control

(Continued from 21 February 1957, pages 275 - 277)

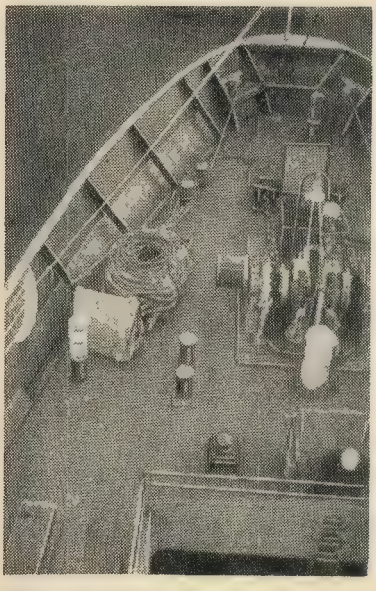
HAVING taken off the shell of the hull from the former, the next thing to be done is to solder the butt strips on the inside to cover the vertical joints between the lengths of plating in each strake.

Some of these, especially in the narrow spaces towards the ends of the ship, will be somewhat difficult of access, but if they are well tinned before placing them in position they can be soldered by applying the heat on the outside, provided they are pressed closely to the hull while soldering, for which purpose a wooden pad would be useful.

DECK ANGLE FOR STIFFENING HULL

Next we must solder an angle plate, about $\frac{5}{16}$ in. wide × $\frac{1}{4}$ in. deep, made from 0.012 in. tinplate, all around the inside at the level of the shelter deck.

The fo'c'sle head, showing the fore hatch in open position



In the model the shelter deck is discontinued amidships, but the angle, if continuous, will not be in the way, and it will add greatly to the stiffness of the hull.

The angle will be approximately a right angle in section from Station 7 forward to Station $\frac{1}{2}$ aft, but further aft it will be somewhat less and further forward it will be considerably less in places to suit the flare at the bows. It could be shaped approximately to the former in the first place, but must finally be fitted accurately to the hull itself.

The sections at the radius of the bow and stern should be made separately. They can be built up of two pieces, one horizontal to follow the slope of the deck, and the other conical to suit the hull. These are shown in Fig. 20.

The ends of the vertical strip are carried beyond the edge of the horizontal plate, and the vertical web in each of the angles is cut away to suit. When both end pieces are a good fit they should be soldered in position, after which the angles along the sides should also be fitted and soldered in position.

This position is important. Amidships it should run along against the lower edge of the bulwark shown in Fig. 16, and fore-and-aft of that it should be parallel to the upper edge of the sheer strake No 1, and about $\frac{1}{8}$ in. below it. Towards the bow it falls away a little, until at the extreme forward edge it is $\frac{1}{4}$ in. below. This is shown in Fig. 21 and the profile of the vessel on page 97 of the issue for January 17.

THE RUBBING STRAKES

The rubbing strakes should now be be taken in hand. In the ship they are 9 in. wide by 12 in. deep. In the model they would measure only 0.15 in. wide × 0.20 in. deep or approximately 5/32 in. × $\frac{3}{16}$ in. They ought to be made of hardwood, but in these dimensions they would be rather fragile and if they were damaged in operation on the lake it would be an awkward job to replace them. So I recommend they should be made of brass rod, bent to the shape of the hull and fixed by means of tiny screws from the inside or rivets right through (see Fig. 21).

In either case washers should be used under the heads on the inside or, better still, a continuous strip of 16 S.W.G. brass, $\frac{1}{2}$ in. wide. The rubbing strakes are 32 in. long and extend from 0.4 in. aft of Station 8 to 1.2 in. aft of Station 2. The height from keel to underside of the strake is 3.4 in. amidships, 3.7 in. aft and 3.8 in. forward. The curve should follow the run of the strakes and must be smooth throughout.

BULKHEADS

One or two bulkheads should now be fitted to prevent distortion of the hull during the building operations. It is difficult to determine either the number or the position of these, especially in the machinery space, until the internal arrangements have been finalised; but it would be safe to build one in at Station 8.

This would stiffen the deck where it supports the curved front of the superstructure, and would allow the front part of the ship as a buoyancy compartment to be sealed off. The space is not required for the power plant nor for the radio control gear, as there is sufficient space for all this in the remainder of the hull.

The hatch could be a dummy, and the only openings in the deck would be the hawse-pipes, and these lead to the sides of the bows and not into the hold. The crane will require a pivot on which to rotate but this can be provided without perforating the deck.

The outline of the bulkhead must be taken from the section at Station 8 in the Body Plan, Fig. 3. It will fit under the angles along the sides and should lie closely against the inside of the plating on each side as shown in Fig. 22. It is made from 0.012 in. tinplate and should be flanged to a depth of $\frac{1}{8}$ in. all round.

The upper edge under the deck should be flush with the top of the angles along the sides and on the

centre line of the hull it should be 5/32 in. higher, sloping down in a smooth curve to each side. The corners may need to be joggled slightly or shaped to clear the angle, but the angle is so thin the discrepancy could be made up with solder.

The same applies where the bulkhead fits against the inside of the "in and out" plating—as shown in exaggerated form in Fig. 22. The flange should face aft, and the bulkhead is fitted by pushing it forward to meet the sides of the hull as they come together. When it is fitted as closely as possible, it should be soldered in position, filling any spaces with solder and making sure of a good fillet of solder on its forward side.

PREPARATIONS FOR THE FORWARD SHELTER DECK

With bulkhead in position, the sheet of tinplate which forms the after section of the foredeck should be prepared. Its shape is shown in Fig. 23, the forward edge being straight, and the after edge coinciding with the flange of the bulkhead for about 5 in. in the centre, then following the curve of the superstructure for about $1\frac{7}{8}$ in. on each side, and continuing aft to fit the angle, terminating at a point $2\frac{1}{2}$ in. aft of Station 8.

This plate should be soldered to the side angles and along the top of the bulkhead, making sure that it is quite watertight.

A strip of heavier tinplate or 20 S.W.G. brass, 1 in. wide and about 11 in. long, is required next. This should be bent to the radius of the inside of the superstructure, which is about $4\frac{3}{16}$ in. It is cut away to $\frac{3}{4}$ in. wide at each end and for 5 in. in the middle so that it rests on the flat plate just described and butts against it at the two curved corners.

This will be seen in Fig. 23. The "flat" plate is, of course, slightly curved to suit the camber of the deck. If the curved plate is soldered at right angles to the deck it will slope backward at the centre line of the ship and thus suit the sloping front of the superstructure. The plate extends to within $\frac{1}{16}$ in. of the plating on each side of the model, leaving a clearance which allows the superstructure to fit between.

FO'C'SLE DECK BULWARKS

The photograph of the fo'c'sle head reproduced herewith shows many items of interest. The fore hatch is open and the windlass figures prominently just forward of it. Immediately forward of the windlass there is a small hatch—shown open—leading down to the windlass motor room and the paint room.

The chain stoppers and hawse-pipes are on either side and forward of it. In the bows there are two sets of fairleads for the mooring ropes, and as these are our next job we must examine them.

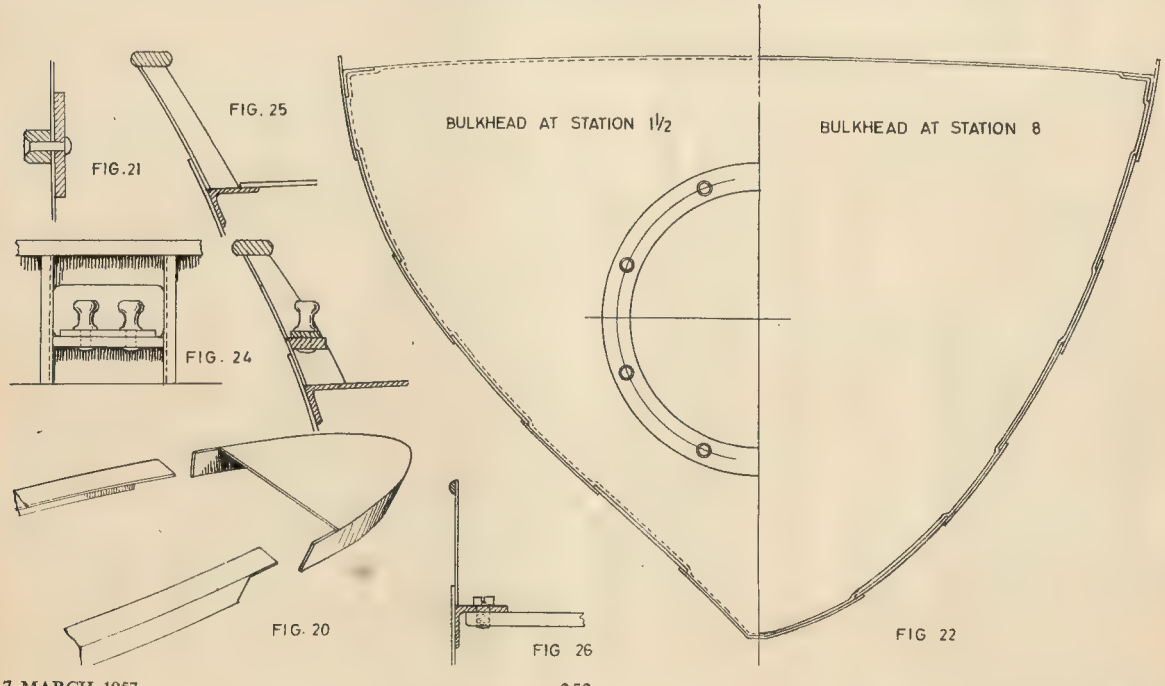
On either side of the openings in the bulwarks is a flanged gusset plate with a stout platform between them. The gussets should be made of tinplate and the platform of 16 S.W.G. brass soldered between them as shown in Fig. 24.

The fairleads can be made by turning two brass pips to the required shape and riveting them into a brass plate $\frac{1}{2}$ in. long $\times$ $\frac{1}{4}$ in. wide. In this particular case the brass platforms could be drilled with the base of the fairleads and the ends of the pegs carried through both plates and riveted below, before assembling them with the gusset plates.

The assemblies should now be placed in position temporarily, and the position for the holes in the bulwarks marked out, after which the holes should be cut out. The assemblies can then be soldered inside the bulwarks and on to the deck, after ward finishing them off flush with the top of the bulwarks and level across.

Four similar gussets should be fitted on each side to reinforce the raised bulwark. In the photograph these are seen to reach from the upper half of the raised bulwark to the deck, spanning the plate between; but in the model it would be simpler and stronger to fit them to both plates as shown in Fig. 25.

They should be made from 16 S.W.G. brass and filed to be a good fit on the side and angle plates, and finished off flush with the top of the bulwarks. A dotted line will be seen in the plan in Fig. 23 indicating the edge of the deck plate. This plate will be soldered in position later. Care should be taken to see that the lower corners of the bulwark gusset plates leave room for this.



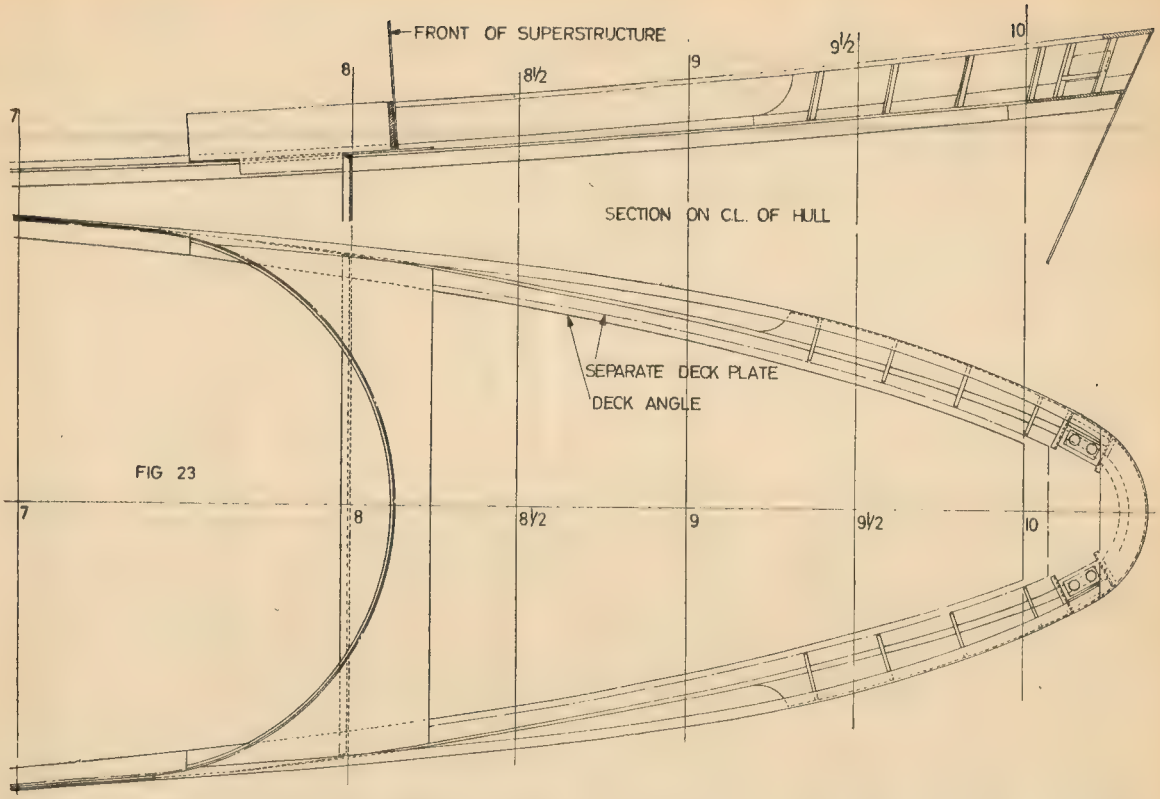


FIG 23

The plate across the front of the bulwarks should be fitted at this stage. It is of 16 S.W.G. brass, or it may be slightly thicker, cut to the shape of a half moon as shown in Fig. 23, being $\frac{3}{4}$ in. wide and $2\frac{5}{8}$ in. long on the chord. It covers the bulwarks and projects about 1/32 in. beyond them, the edge being slightly rounded to match up with the rails, which blend into it aft and will be fitted later.

With this in view the after edge should be sharp and square, so as to ensure a good joint. This piece and the gusset plates will protect the bow bulwarks from damage when working on the model.

THE AFTER SHELTER DECK

Although, as already stated, it is inadvisable to fix many bulkheads in the model until the internal arrangements have been finalised, we can safely fit a second one at Station $1\frac{1}{2}$ which is just aft of where the propeller shafts pass through the plating of the hull.

The outline at this point is quite straightforward and there would be no difficulty in fitting it. This internal space cannot be sealed as was done at the bows, because there must be access to the steering gear.

A deck beam can be fitted at Station 3, as the afterdeck will terminate at about this position, and this beam will enable provision to be made for preventing the ingress of water at the after end of the superstructure.

With the bulkhead and this deck beam, the after part of the hull will be quite rigid. There will, of course, be additional beams across the midship section of the hull, but these will be arranged later.

In the meantime it is suggested that two stiffeners be fitted temporarily across the hull between Stations 4 and 5 and 6 and 7. These could be in the form of brass strips, 16 S.W.G. and about $\frac{1}{2}$ in. wide, drilled and tapped for a 6 B.A. screw at each end. Corresponding clearance holes should be drilled in the angles and, with the strips *underneath* the angles, 6 B.A. cheese-headed screws should be screwed in firmly to secure them. Fig. 26 will make this clear.

I may mention here that I propose to make the superstructure so that it will lift off bodily from its curved front to its rear end and, as the underside of this is open and there is no deck under it, it is important that an efficient water seal be provided.

THE AFTER BULKHEAD

Dealing first with the bulkhead—apart from its shape it will be substantially the same as the one already fitted at Station 8. Its shape may be taken from the section at Station $1\frac{1}{2}$ in the Body Plan Fig. 3, allowance being made for a flange $\frac{1}{8}$ in. deep all round. Note that in this case the flange must face forward. The upper edge will be curved to make it 5/32 in. higher in the centre than at the sides to give the correct camber to the deck.

The corners will be shaped to clear the angles along the sides, and it must fit closely on the inside of the hull plating, see Fig. 22. In soldering it in position it need not be watertight, but it should be fixed firmly all round so that it does its job of maintaining the correct shape of the hull.

In view of the possibility of radio control being installed, it would be advisable to fix a removable plate in the centre of this bulkhead. I would suggest a $2\frac{1}{2}$ in. dia. hole be cut with its centre $2\frac{1}{2}$ in. below the upper edge of the bulkhead.

A brass ring $\frac{1}{16}$ in. or more in thickness and 3 in. external dia. should be soldered around this hole, and drilled and tapped through for eight small B.A. screws. The ring should be on the after side of the bulkhead so that the cover plate fits on it. The cover plate should be of brass, about 18 or 20 S.W.G., and any holes in it could be bushed to protect any leads that pass through it from chafing.

● *To be continued.*

AROUND THE TRADE

A regular feature describing tools and accessories of use in the workshop

ANTI-RUST LIQUID

Claimed to protect tools and all ferrous metals from rust, Oxynil is a liquid with a high-creep characteristic which will rapidly spread to every part of the work after being sprayed on.

Oxynil is completely water-resistant and can only be removed by the application of paraffin, turpentine or more of the liquid itself.

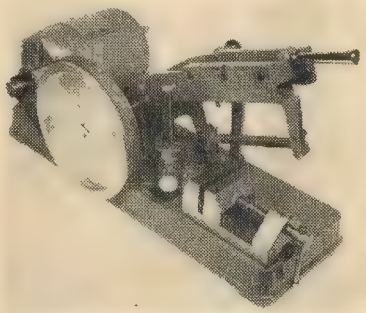
Sole agent is H. M. Gibson, Church Lane, Gt Hallingbury, Bishops Stortford, Herts.

MINIATURE POWER HACKSAW CASTINGS

E. W. Cowell Ltd, 7a, Sydney Road, Watford, Herts, are now supplying castings for the miniature power hacksaw designed by A. E. Bowyer-Lowe.

This machine is of simple but sound design, with a minimum of structural and working parts. Special features include feed relief dashpot with fine adjustment for the rate of cutting, and automatic stop device operating the motor switch.

The machine can be driven either by individual motor, or from an external source of power. The work capacity of the machine is up to 2 in. dia. round or square and the blades employed are ordinary hacksaw blades (high-speed preferred) cut down to length and clamped to the frame after pre-tensioning the latter with a special tool.



A miniature power hacksaw machine made up from castings supplied by E. W. Cowell Ltd

UNIVERSAL FILE

The Tresa file, which was first demonstrated at last year's M.E. Exhibition, offers many advantages over conventional types.

It employs a thin blade of strip steel in which cutting teeth are formed on both sides by perforating and forming in the manner of louvre ventilating slots, the edges on both sides being specially sharpened and hardened. This blade is held under tension in a metal frame, which supports it over the full length against cutting pressure. It can be instantly removed by slackening the tension screw in the handle, in order to use the other side or to fit a new blade.

The file is non-clogging and can be used on materials which are difficult to work with ordinary files. It cuts rapidly and does not leave scratches. While suitable for use on all metals, its qualities are specially apparent when working on wood, plastics, rubber and leather. Woodwork can be shaped to produce a finish equal to that obtainable with a plane or other cutting tool, with the added advantage that the presence of a nail or screw does not harm the file blade.

Tresa files are supplied in three blade sizes: narrow, with a cutting area of 9 in. × ½ in.; standard, 9 in. × 1 in., and long, 12½ in. × 1 in. They are manufactured by the Tresa File Company, Oxford Airport, Kidlington, Oxon.

Fitting a new blade to the Tresa file takes only a few seconds. The file can be used on wood, metal, plastics, leather, etc.

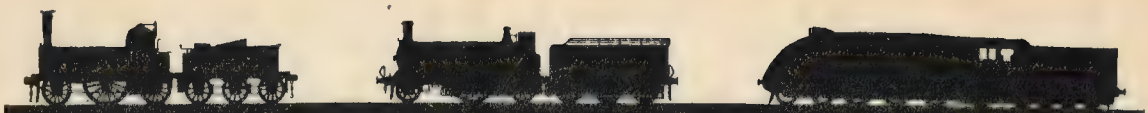
SIMPLE LOCOMOTIVE

To meet the demand for a robust and reliable engine for heavy duty passenger hauling on garden railways, Messrs Bassett-Lowke Ltd, Northampton, have introduced a new 0-6-0 tank locomotive in 7¼ in. gauge, which will negotiate curves of small radius and will haul 20 or more passengers at a speed up to 6 miles per hour.

This has been specially designed by A. E. Steel, A.I.Mech.E., and can be built in a moderately equipped workshop, as the wheels are less than 8 in. dia. and other components are mostly of a simple and straightforward nature.

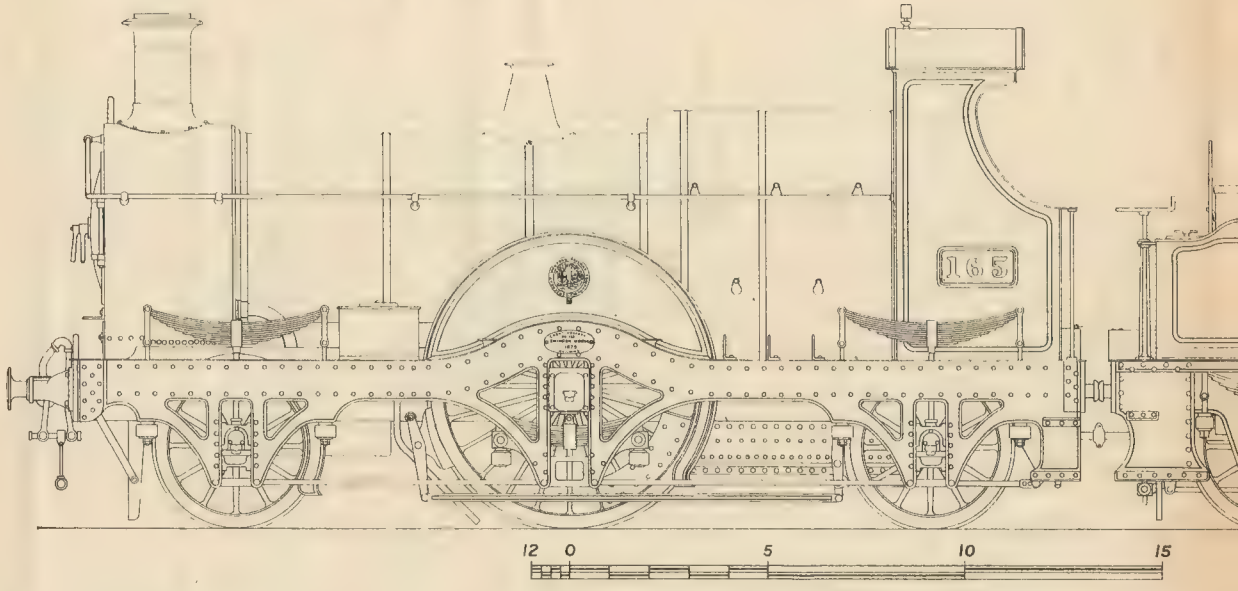
The design is free-lance and does not follow any full-size prototype, but is generally true in character to British locomotive practice, and gives scope for individual treatment of outline details.

All essential castings, also material for the main frames, and the major boiler fittings, are obtainable, together with full working drawings. Finished boiler and cylinders, also certain other fittings, are supplied only to special order.



LOCOMOTIVES I HAVE KNOWN

NUMBER 28: By J. N. MASKELYNE



GREAT WESTERN RAILWAY

2-2-2 Number 165

This was the last engine with this historic wheel arrangement to run in regular service in England

THIS IS AN engine I came to know very well somewhere around 1908. She was then stationed at Oxford, whence she often worked fast trains to London until about 1910 when she was put on to purely secondary duties.

She spent her last years working stopping trains on the Fairford branch, generally doing quite well with them in spite of the fact that she was scarcely an ideal type of engine for such a job.

She was one of a class of 10 engines built at Swindon in 1878-9 to replace 10 very similar engines that had been built by Sharp Stewart and Co. of Glasgow, in 1862. The new engines, like the old ones they superseded, were numbered 157 to 166 and originally they all had domeless boilers.

In course of time reboilering was needed, and when I made my first acquaintance with this class, in the early 1900s, hardly two of the engines were exactly alike in appearance. No 160 had a large boiler with a Belpaire firebox and a big brass dome; her cab was almost the full width of the running plate and had a high rounded roof.

Nos 159, 163 and 165 had domeless boilers with Belpaire fireboxes, as seen in the drawing; but although the height of their cabs was increased to

clear the fireboxes, the width was not altered. Nos 161, 162 and 164 had small boilers with flush, round-topped fireboxes and the dome on the back ring. No 166 had a similar boiler, but with the dome on the front ring.

No 157, however, was the most distinctive of them all; her boiler was of the Wolverhampton pattern similar to that of No 999 (see article No 16). It had the characteristic round-topped, raised firebox, and the tall brass dome was placed at the forward end of the barrel close to the smokebox. No 157 carried this boiler until she was withdrawn.

Until the early 1900s, these engines were employed chiefly on expresses between London and Birmingham, a route on which they were well known and very popular. No 162, *Cobham*, the only named engine of the class, was in charge of Driver David Hughes for many years on this service, and had a wonderful reputation for punctuality. It is said that many station-masters, and some of the farmers near the line, would set their clocks when Hughes and *Cobham* passed by.

It was in their last years that I got to know several of these engines; by that time, they had been taken off the Birmingham expresses, and were working semi-fast trains between Paddington, Oxford, Swindon and Bristol. Occasionally, one would be seen on the Berks and Hants line working to or from Winchester via Newbury.

No 165, rebuilt as shown in the drawing, was then stationed at Oxford and sometimes came up to London. The last time I saw her at Paddington was one morning in the summer of 1910, when she arrived on a two-coach special which, I was told, was conveying a party of Oxford dons to some convention or conference. She returned home on the 12.30 p.m. to Oxford, piloted by a 4-4-0 of the Atbara class, and so far as I know, she never came to London again.

The normal duties of No 165 were the stopping trains between Oxford and Reading, or Banbury; but she very often worked on the Fairford branch, and actually finished her days on that line. She was withdrawn for scrap, the last survivor of her class, in December, 1912; incidentally, she was the last 2-2-2 type engine to be in regular service in England.

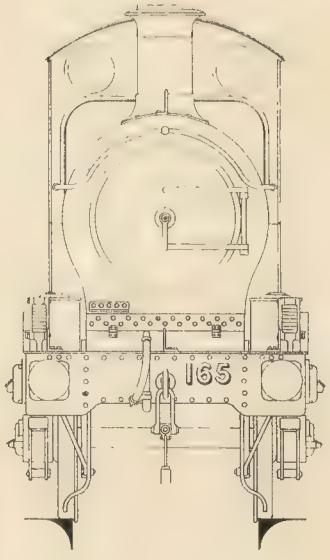
Her dimensions were: cylinders 18 in. dia., 24 in. stroke; leading and trailing wheels 4 ft dia.; driving wheels 7 ft dia.; wheelbase 17 ft 8 in., divided into 8 ft 6 in. plus 9 ft 2 in.; the overhang was 4 ft at the front and 3 ft 9 in. at the back.

The domeless boiler with raised Belpaire firebox shown on the drawing was not a new one; it had been put on to a sister engine, No 159, in June 1900 and was transferred to No 165 in July 1906 after No 159 had been scrapped. The diameter of the barrel was 4 ft 5 in. and its length was 11 ft. There were 244 tubes of $1\frac{5}{8}$ in. dia.; the firebox was 5 ft $1\frac{1}{16}$ in. long and 3 ft $3\frac{1}{8}$ in. wide, its height 6 ft 2 in.

The heating surface of the tubes was 1,174.25 sq. ft, and that of the firebox 115.6 sq. ft, making the total 1,289.85 sq. ft. The grate area was 18.37 sq. ft and the working pressure was 165 lb., believed to have been increased at a later date to 180 lb. The engine weight in working order was 38 tons, approximately, but I have not been able to discover the precise details as no official diagram seems to have been issued for an engine of this class rebuilt with the domeless Belpaire boiler.

The original tenders for these engines were of the Armstrong sandwich-frame pattern with 3,000 gallons capacity; but in my time all the engines, except No 157, had been fitted with standard Dean tenders, which did not match up with the engines so well. No 157 retained her original tender until she was withdrawn in June 1903.

The only other engine of this class to be rebuilt with a domeless Belpaire boiler was No 163; in this form, at first, she looked exactly like No 165 but later on she was provided with a very tall, slender-looking safety-valve casing which gave her a distinctive though decidedly curious appearance. I never knew the reason for that particular casing, and I certainly never saw another like it on the G.W.R. If Swindon was merely trying it out as an experiment in aesthetics I can only say that it was not particularly successful! ▣



A question of L. s. d.

L.B.S.C.'s article this week is intended for those who fear shallow pockets debar them from locomotive building

AN OLD correspondent informs me that he overheard some remarks to the effect that it is all very well for L.B.S.C. to write "chuck in three-jaw, turn, face, drill, ream, screw and tap," but what about the poor unfortunates who don't possess the chuck, drills, reamer and dies and, having a wife and children to keep, can't afford to buy them?

Well, it is a thankless task to try to please everybody, but I'm here to do my best; so maybe a word of good cheer to the "financially embarrassed" may not come amiss.

I know—and only too well—what it means to have an intense longing to do something or possess something with apparently no earthly chance of satisfying that longing. In reminiscences of my childhood days, recounted in past issues, I told the story of how a frantic yen to drive a full-size locomotive was suddenly and dramatically made possible by a gust of wind blowing through a passage in a railway station; truth was ever stranger than fiction!

Also, I told how I started locomotive building with a soldering bit, a couple of worn files, an archimedean drill, and a carpenter's square, once the property of a grandfather who left this world just eight years before I entered it.

Granny gave me an old pair of scissors which were strong enough to cut tin, and my workshop was, first, the corner of the kitchen table, then a 3 ft length of 1 in. planking placed across the arms of the baby's high chair in which I once sat.

On that, with the tools mentioned, I built my first working locomotive; cost exactly nil. Looking back, I can honestly say that I got as much pleasure out of that job as I get at the present time in building a modern type of engine with the equipment that I now possess.

Improvisation

There is no need to repeat the full story of how I earned pennies of running errands, repairing leaks in neighbouring housewives' utensils and doing all sorts of odd jobs. We were desperately poor and most of the proceeds went on food, but I managed to get enough to buy a few small tools such as hacksaw and pliers. They were really cheap in those days; the saw cost ninepence, the pliers sixpence.

I spent little on material but I was always on the lookout for anything that would come in handy. For example, the local clockmaker, for whose wife I ran errands, gave me the broken works of a big clock. I salvaged wheels and spindles out of it; the brass frame-plates, which were nearly $\frac{1}{8}$ in. thick, provided portblocks, cylinder faces, and bearings for several steam-engines.

The brass spring barrel made a first-class front roller for my crude copy of the local steam-roller, the back rollers of which consisted of the case of a cheap German alarm clock cut down the centre.

The oscillating cylinder of this engine was a cartridge case. The portface, portblock, and reversing block were all pieces of brass cut from the clock frame, the portface being soldered to the cartridge-case cylinder. In the frame was a tapped hole with a spindle screwed into it which I utilised for the trunnion pin, cutting the rest of the portface around the spindle and drilling the port to suit.

All the working faces were trued up on a piece of emerycloth laid on the working side of mum's flat-iron which I propped upside-down on my patent high-chair bench between two pieces of wood. Mum never objected to my using the iron, as long as I didn't use it for an anvil!

What I actually did use for an anvil was a circular cast-iron weight which originally belonged to an old-fashioned lavatory cistern. This had no syphon, only a brass mushroom valve over the outlet pipe with a big rubber washer which was supposed to prevent leakage. The weight was on top of the valve to keep it closed, and there was a hole in the middle for the link which connected it to the inner end of the pull lever. The hole was handy for such jobs as knocking out pins and bushes.

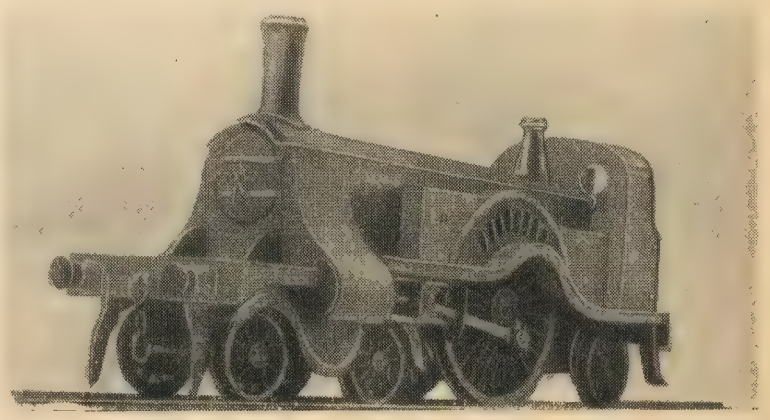
Twist drills being beyond my slender means, I had to make all my own drills. The archimedean drill had no proper chuck. There was just a hole in the end of the spindle which opened about $\frac{1}{2}$ in. up into a bevel filed across the spindle. Mum gave me a couple of steel knitting-needles which just fitted the hole.

To form a drill, I made the end of a knitting-needle red hot, placed it on the edge of my anvil, gave it a hearty wallop with the domestic coal-hammer, which flattened it out, then carefully filed the point to an arrow-head of the desired size.

The cutting edges were then backed off, the drill hardened and tempered (the kindly proprietor of the local tool store told me how to do that) and rubbed up on a little oilstone slip which cost threepence. The end of the shank was filed off at an angle to suit the bevel at the end of the hole in the archimedean spindle, which acted as a drive.

I don't remember ever breaking one of these drills, but if I had it wouldn't have mattered as there was enough steel in one knitting needle for half-a-dozen drills. I cut them to whatever length I found convenient. Later, when I acquired a used screw-plate, I made taps from pieces of knitting-needle, screwing them in the usual way, then filing four flats and slightly tapering the end. When hardened and tempered, and the

J. Davies's 2½ in. gauge Stirling G.N.R. single-wheeler



flats had been rubbed on an oilstone, they cut threads good enough to serve my humble purpose.

Something of all sorts!

In days long past there used to be a standing joke about certain Chicago pork-canners who utilised every part of a pig except the grunt. The materials that I used in my engine building put me in the same category.

The steam-roller previously mentioned was fitted with gearing from the clock wheels; the steering-gear spindle had a handwheel on one end which was a small clock wheel with the teeth filed off. The worm at the other end was a small brass wood-screw meshing with another small clock wheel on the chain shaft; the chains came from a broken toy.

I had a windfall when the cast-iron front of our kitchen fender was accidentally broken and mum said I could have the pieces. The bottom plate was mild steel of about 18-gauge, and the front was attached by round-head screws with square nuts. When I dismantled it I reckoned that I was well set up for material.

I cut a pair of locomotive frames out of the fender bottom, and a long and laborious job it was, but I managed it with the hacksaw, a chisel, and the coal-hammer. I had a vice by that time, but it was a tiny thing intended for fretwork and had a cramp arrangement underneath it for clipping to the edge of a table. Nevertheless I managed to hold my frames in it while I filed off the ragged edges left by saw and chisel.

When writing about piston fits I often recall with a smile how I made the piston for my cartridge-case cylinder. The case was, of course, much longer than the length needed so I cut off the surplus, which was near enough the length of piston needed.

On a piece of wood I marked a circle with my school compasses the size of the offcut, drilled a hole in the middle at the spot marked by the compass point, put my piston rod in it (a straight piece of tinned iron wire about $\frac{1}{8}$ in. thick) and set the brass offcut to the marked circle, putting some pieces of wood around it to prevent shifting.

The whole bag of tricks was then placed on the steps outside the kitchen door and the brass offcut filled up with lead melted in a tin lid over the kitchen fire.

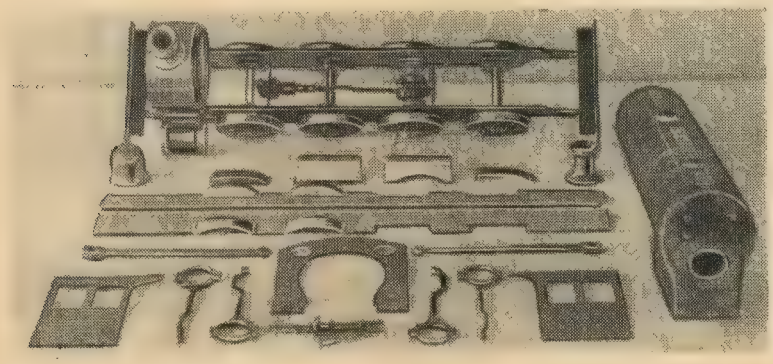
When it cooled off, I very carefully sawed a slit in the offcut and peeled it off the lead core, leaving a piston complete with rod which exactly fitted the cartridge-case cylinder after easing with emerycloth. I was careful to clean off all traces of the abrasive, otherwise my cylinder would have automatically been lapped out.

A groove was filed in the leaden piston and packed with a bit of wick taken from an old-fashioned tallow dip. That piston lasted the lifetime of the steam-roller, which endured until the soldered-up tin boiler, which had started its own life as a cocoa-can, rusted through and became unrepairable.

One of the ragtime locomotives which I built had two similar cylinders, and it worked very well. They were single acting, with opposed cranks, the engine being a 2-2-2 with the port-blocks over the small leading wheels.

A 2½ in. gauge L.B.S.C.R. tank engine also built by J. Davies

Parts of J. Davies's 3½ in. gauge NETTA



Economic hints

I built various kinds of stationary engines with tin-can boilers, built-up cylinders, and all sorts of weird and wonderful oddments; they all worked well and gave me pleasure and satisfaction. When I became tired of one I sold it for perhaps sixpence, or even a shilling, to one of my school friends and I never had to search for a customer; in fact I had a waiting list.

Unfortunately we were too poor to allow all the proceeds of the "Curly Engineering Works" to be ploughed back into the business; a growing child needs food and clothes, and poor mum was glad of my efforts.

However, the point of all these reminiscences is just this. Certain critics of these notes aver that to build a locomotive to my instructions a fully-equipped workshop is needed, and the owner should be a member of the "Millionaires' Club" to be able to purchase all the necessary castings and material; but they forget that there is another side to the story.

At the time I started this series, by request, tools, castings, and materials were cheap and in abundance. All that readers required was the know-how to build locomotives that would do a real job of work equivalent to that performed by their full-size relations. I did my best to supply just that.

The second orgy of senseless blood-shed and destruction, and the terrific rise in the cost of everything which has followed, is unfortunate enough, goodness only knows, but it cannot be laid at my door; and the equipment, materials and labour needed to build

small working locomotives in the way I usually describe remain the same.

However, the corresponding rise in wages, salaries, or whatever else you like to call the reward that sweetens labour, has enabled most folk to meet the increased costs; therefore, I still say "Chuck in three-jaw, turn, face," and so on. Scores of enthusiastic builders have acquired lathes and other equipment on the "never-never" and by purchasing castings and material as needed for the job in hand they have been able to enjoy the pursuit of a really fascinating hobby with a "balanced budget."

It is still possible to build locomotives with the most meagre equipment and the rock-bottom of outlay. A basis for the start of operations can be found in household tools, even if they constitute only a hammer, chisel, and a pair of pliers. Naturally somebody will immediately ask, how do we bore a cylinder and turn the piston without a lathe?

Who said that it was absolutely necessary to bore cylinders and turn pistons? Any metal merchant will supply a few inches of drawn brass tube and a short piece of rod that is a sliding fit in it—and there is the nucleus of a pair of locomotive cylinders. Stamped brass blanks are commercial articles; there are your flanges and covers.

Wheel-turning? If I had no lathe and I wanted to turn wheel castings I would soon rig up a ragtime headstock with a piece of flat iron-bar bent channel-shape, with a spindle through it and a handle on the end for driving. Even a vice could be improvised with two scrap bits of angle iron and a couple of bolts. Where there's a will, there's a way, says the old saw; and truer words were never spoken.

Readers' work

In a recent Smoke Ring, reference was made to a correspondent, who referred to the scarcity of photographs and descriptions of the handiwork of readers of this journal, so here are some examples which will help to fill the gap.

Mr J. Davies of Bideford in Devon, doesn't believe in letting grass grow under his feet. The Stirling eight-footer shown in the accompanying picture is a 2½ in. gauge job with a coal-fired boiler and loose-eccentric valve gear; castings were only used for the wheels and cylinders, everything else being fabricated. The tender is nearly ready and only needs axleboxes and coal rails to complete the job.

Another photograph shows a 2½ in. gauge L.B. and S.C.R. tank engine. She has a water-tube boiler fired by an oil burner of my "axle-dodger" type; and except for wheel castings and dome cover it was made from built-up components. All parts of both these locomotives were made to specifications in these notes.

A third picture shows a 3½ in. gauge *Netta* under construction. The tender for this one is finished, Mr Davies having literally "put the cart before the horse." He has also built another 3½ in. gauge engine to my design, a *Bantam Cock* which has given hundreds of children rides on a short portable track.

On one occasion our friend took her to Newton Abbot to see how she behaved on the local club's continuous track. A friend accompanied him, and when they got up steam a terrific thunderstorm came on. Our friend says that they were determined to run the engine, storm or no storm, and they both became soaked to the skin, but the engine didn't seem to worry and they thoroughly enjoyed themselves!

Mr Davies is also building *Virginia* and the job is well under way; he says it will be a very pretty locomotive and a type which he has wanted to build for a very long time. He also goes in for traction engines, having built a 1½ in. scale Aveling and Porter, and he has started another of the American Case type. He says it keeps his mind off other troubles!

Well, they say that a change of work is the best rest—maybe that is what keeps your humble servant in the Peter Pan category, as I am continually changing from lathe and bench to drawing-board and typewriter, and doing other oddments very far removed from locomotive work.

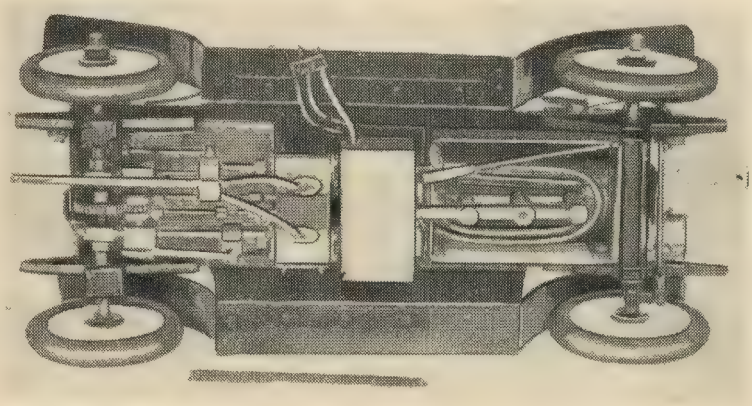
Driftwood blunted saw

The little Stanley steam car illustrated was built by Mr S. Reeves of Chichester. The wheels were turned from a piece of wood originally picked up on the beach and intended for firewood; but it blunted our friend's saw and when he attacked it with an axe, the handle broke, so he thought it might be O.K. for turning, and so it proved! The tyres are made from Calor gas tube. All the sheet-metal work was made from a Redex oil drum.

The engine shaft and rear axle are fitted with Hoffmann ball-bearings. The leaf springs were made from a spring which did duty in a clock for 90 years before breaking. The cylinder block was mounted on pivots to allow the springs free play. The car body was built from pieces of thin plywood which once formed the bottoms of boxes containing Italian fancy cheese bought during food-rationing. The floor is glass, so that the engine can be seen by lifting the lid of the boot. The steering column is a piece of steel rod with a hole drilled through it for the spindle. Mr Reeves says he drilled it from both ends and didn't need to make an extension drill.

The car works all right, and our friend is certainly deserving of hearty congratulations for his ingenuity in securing materials, as well as for his workmanship; and the job presents a fine object-lesson to those misguided folk who are forever raising moans about excessive cost! ▣

Underside of the Stanley steam car built by S. Reeves



GEAR CUTTING

Gear Wheels and Gear Cutting, by Alfred W. Marshall, explains the principles which govern the formation and numbers of the teeth for a given mechanism and describes the types of gears in general use.

There are numerous illustrations in this 92 page book, price 3s. 9d. post paid, which can be obtained from Percival Marshall and Co. Ltd, 19-20, Noel Street, London, W.1. Rate in U.S.A. and Canada is $1.00.

A TOOLROOM GRINDER

B. HOPKINS describes a machine which incorporates several worthwhile features

AS MY INTEREST in model engineering is centred around the making of model aircraft, diesel and glow-plug engines I felt the need of a grinding machine for crankshafts, pistons, numerous hardened parts and the regrinding of milling cutters.

Having been associated with fine grinding for some years I decided to build a machine on the lines of a tool and cutter grinder, but using one or two of my own pet ideas for the construction of the machine. One cannot use it as fast as a commercial machine, but the same accuracy of work can be obtained.

The stand is made from 1¼ in. H section iron and 1¼ in. angle iron with a ½ in. thick slab of mild steel on the top to form a base plate for the larger portion of the machine.

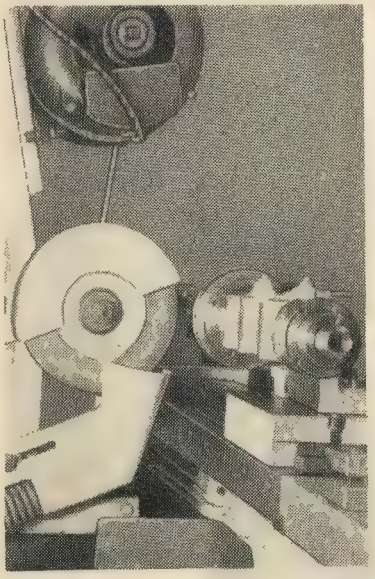
The main slide table I found in a pile of junk along with an 18 in. stroke hand-operated planing machine; all the flat machining was done on this particular machine. This table was hand scraped flat along with all the other flat surfaces, including all V-slides.

There is only one master slide on the moving table and it is kept tight by two spring-loaded rollers at the front of the machine. The slide is moved to and fro by a wire cable driven by a friction V-drum. The handwheel is the flywheel off an old petrol engine.

There is a reduction gear from this by V-pulleys and V-belts, the belts and cable being kept in tension by adjustable roller tensioners. The reason for using this method of moving the table is that I don't like racks and pinions or gears in grinding machines.

The movement of the table is absolutely free of jerks and jolts and is in fact "as smooth as silk." The grinding head table is of conventional V-slide pattern, the leadscrew being 16 t.p.i. so that using a Myford handwheel 0.001 in. on the index is 0.001 in. taken off the diameter of the work being ground.

Not fitted yet is a 0.001 clock on a slide, similar to a jig-borer, so the handwheel is used for thous and the clock for tenths. With care one can work to 0.001 in. quite easily as it is. The motor is a ¼ h.p. Hoover, 1,424 revs, which drives the spindle at 2,850 r.p.m.



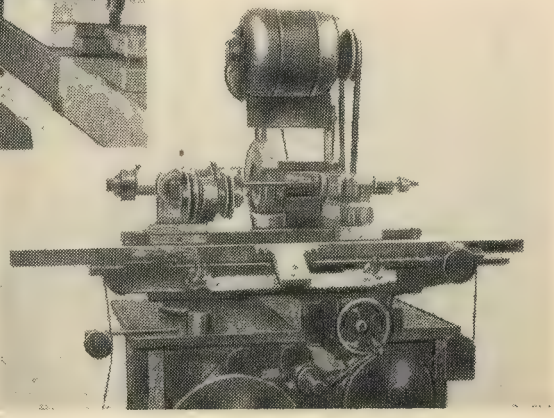
A close-up view, showing the motor mounting and grinding wheel

It was intended to make a lapped spindle running in chilled iron bushes but as time was pressing for some work on a very sick 5 c.c. glow-plug motor, I tried a Picador Speedshaft. The finish obtained from this has been very good indeed so it has been left on.

The head is fully adjustable for height and squareness. The motor is mounted with the weight directly over the sliding V-table upon which it is mounted; its weight is then directly on top of the slides and this cuts out any tendency for the V-slide to "float."

The headstock workhead is fully universal and located for centre grinding by taper dowels. For centre grinding I prefer two dead centres, with a spring-loaded tailstock centre. All bearings have felt dust covers fitted.

The drive for the workhead is taken from a Myford Super 7 by a



A front view of the completed grinding machine

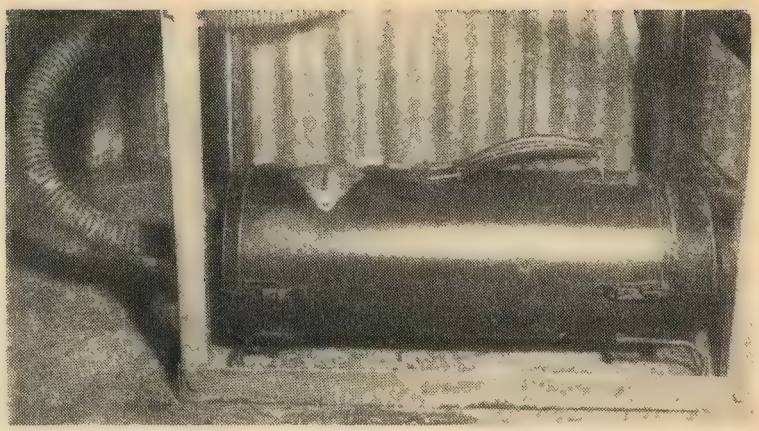
A Toolroom Grinder . . .

long round belt. I reasoned that with a large number of speeds available on this machine it was a waste of time to make any driving mechanism for this part. The castings were made to my own patterns at a local foundry at very reasonable prices.

All machining was done on a Myford Super 7, the aforementioned planer (at least 40 years old but in very good condition), a ½ in. Champion driller, and a lot of hard work with a scraper. The machine has a capacity of 11 in. × 6 in. dia. It has a dust extractor fitted.

The complications of water feed on the wheel seemed unnecessary for the size of work the machine was intended for so I left this out.

Total time of building was 18 months, and cost about £15. Later it is intended to fit an internal grinding head and a dust-proof motor. If any reader is really interested I will supply patterns and drawings of the machine. ▣



The dust extractor fitted beneath the frame

JAPANESE LOCOMOTIVES

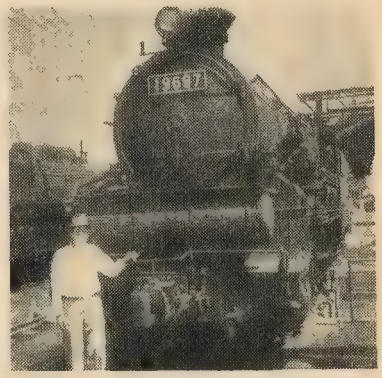
By R. KUSANO

News from a Tokyo model engineer

A DOUBLE-SIZE ⅜ Trojan engine was recently completed by one of my pupils in the school machine shop. It was planned to instal it in a model tug which could tow a small boat belonging to the glee club, of which I am the conductor, during the summer vacation.

So far we have not been able to do this but we intend to go ahead with the plan and also to construct the model locomotive *Maisie*. These projects are unfortunately held up by my ill health.

The picture of the Japanese engines and trains I took myself. ▣



Above: The author standing before a 9600 class 2-8-0 goods engine. Left: A 4-6-4, formerly a 2-8-2 goods engine, taking water at Taira shed. It is fitted with a mechanical stoker. Below: Goods train at Ogawago

A ship modeller's diary

By JASON

ALMOST without exception the societies in the London area are devoting one night in the year to what I call a "hair-down do." The most suitable meeting night is obviously near the New Year. They vary, these nights, but all are enjoyed and all are free from shop talk—and most of them are attended by wives and sweethearts.

Each meeting differs from each other just as each society differs in policy and mood. Wembley for example, is more or less dignified whereas Hammersmith oozes popularity. A nautical touch is the presence of the troop of Sea Rangers. There was, too, a metropolitan air about, for there were present members from every society in the London area—even from Gravesend. Perhaps Hammersmith has achieved all this because of its long experience.

East London, on the other hand, is a much more domesticated affair. A roaring fire, a table full of good things and where fingers and corkscrews are the only tools.

Each society quite naturally has its own ideas about how to run these affairs, but the newest of them all, the South London S.M.S., really let itself go. It had a show of models, a table full of food, a dance band, a well-known variety artist and a sprinkling of pretty nurses from the nearby hospital. Bravo South London!

A room in the "Baltic"

THE Thames Shiplovers, following the successful launching last year of a social evening, repeated the excellent affair this year. Through the good offices of their secretary, Eric Randall, who is on the floor of the world-famous "Baltic," they have the use of a room in the newly-decorated Baltic Exchange. A superb show of models, photographs, etchings and sketches proved a splendid focal point for members and friends to get to know each other between visits to the buffets.

Sheffield usually has a dinner, Birmingham, too, celebrates once a year. Indeed it is nice to see that modellers can "let their hair down" once a year.

Cutty Sark ceremony

THE recent address by Frank G. G. Carr to the Thames Shiplovers on the progress of the work on *Cutty Sark* at Greenwich in preparation for the opening ceremony this summer is a reminder that this is our only surviving British-built clipper. Mr Carr, who is the director of the National Maritime Museum, may be regarded as the prime mover in the scheme for preserving this old clipper. She is popular as a subject for modellers.

W. Field of Birmingham won his second championship cup at the Model Engineer Exhibition in 1951 with an excellent model of this famous ship. Every year there are several models of her at the New Horticultural Hall, Westminster, but I must confess I was very impressed with a letter and 28 photographs of a model made by Mr H. G. Harrison of New Southgate, North London. He claims to be a "lone wolf"—yet a very short distance away in old Southgate a fine model of the same ship was turned out a few years ago and exhibited at the Horticultural Hall. I mention this because Mr Harrison has already had five years' work on his *Cutty Sark* (see pictures).

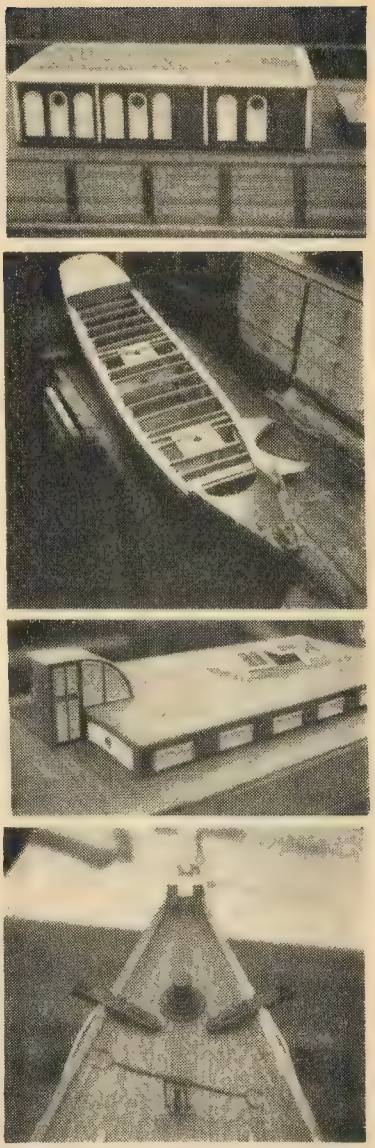
The hull is nearly 5 ft in length and is bread and butter built. The copper plating took 18 months and each one of the 3,000 plates is $\frac{5}{16}$ in. × 1 in. × 0.004 in. The deck planking, usually a weak link (even in the best of models) is correctly made in a 4-step butt. Each plank is $\frac{1}{8}$ in. × $\frac{1}{16}$ in. × 5 in. of teak and "correctly caulked." I'm not at all clear what Mr Harrison means by this, but whatever his method of caulking the decks it is a big job—and it is the first time I have heard of it being done. Note the decking of the fo'c'sle head, how each plank is joggled into the margin plank. Observe, too, the pump handle windlass which "is correct in all working parts." At the other end of the ship is the saloon skylight which is made up of half a dozen "lights," each one a workable hinged affair and fitted with the usual safety brass bars.

Just a name

MR HARRISON in his letter says "five years ago she was just a name to me." Then he goes on to acknowledge his debts to Longridge, Underhill, Lubbock and others . . . now he knows a lot about the "old lass."

"Every hour I've spent in the course of her construction," he adds, "has been thoroughly enjoyed."

Well, there you are! A "lone wolf" right on our doorstep. Would he have been any happier as a member of an established society? I doubt it. Quite likely he would have been quicker and, I suppose, the work would have been easier. Yet, I strongly suspect he is a tradesman as well as a craftsman. ▣



General views of Mr Harrison's model of CUTTY SARK

DUPLEX gives advice on drawing pens and stencils in this further article on

Mechanical drawing aids

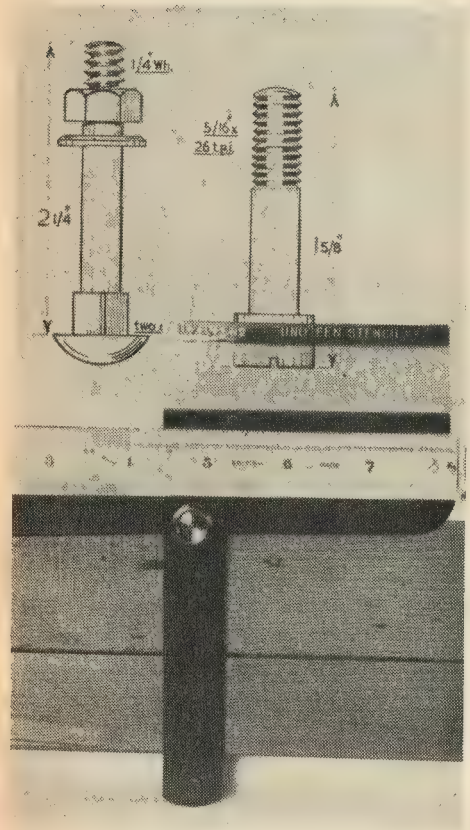


Fig. 19: The pantograph set-square secured with the special clamp

THE APPEARANCE of a mechanical drawing is easily spoilt if the lettering and figures are not correctly drawn. As considerable practice may be required before this work can be done free-hand, or the necessary skill may even be found unobtainable, so it is usually wiser for the amateur draughtsman to rely on the use of stencils for lettering drawings that are intended for reproduction in the press.

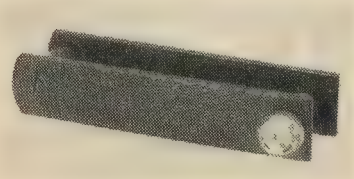


Fig. 20: The set-square clamp

STENCILS

The best known and most widely used examples of these drawing aids are perhaps the Uno stencil sets which are made in a wide range of sizes for drawing capitals, lower-case letters, and figures in several different styles.

Special pens are also supplied which enable the outlines of the cut-out figures to be closely and accurately followed, and the large ink reservoir provided ensures that the pen can be used for a considerable time before recharging becomes necessary.

These special pens are made in two patterns; the ordinary and the de luxe; the latter are on the whole preferable as they are more easily cleaned and maintained in good working order, but the former type have also been found fully serviceable.

When a number of these stencils was obtained some years ago some were supplied with the base line at a higher level than in the others; this difficulty was overcome in the case of the narrower stencils by interposing a strip of plastic material, $\frac{1}{8}$ in. wide, between the base of the stencil and the arm of the set-square so as to obtain the correct alignment.

Where a series of figures or letters has to be drawn in line it is advisable to secure the guiding set-square so that it does not move out of place during the stencilling operation or while one stencil is being substituted for another. In the case of the drawing board previously described this can be readily done by using a special clamp in the way shown in Fig. 19.

The clamp is made deep enough in the throat to enable it to grip either the vertical or the horizontal arm of the set-square in whatever position the square may happen to be. The constructional details set out in Fig. 21 show that the two limbs, *A* and *B*, of the clamp are made from brass or steel strip measuring $\frac{1}{2}$ in. × 3/32 in.

The length, *X*, of the distance piece, *C*, separating the two limbs of the clamp should be machined about $\frac{1}{16}$ in. greater than the thickness of the drawing board to enable the clamp to be easily applied. A single 2 B.A. screw with countersunk head is used for securing the parts in place.

The knurled finger-screw, *D*, was made by pressing the threaded steel shank as a force fit into the brass head, and the latter was finally lacquered so as to be in keeping with the rest of the drawing board fittings. When brought into use the clamp is applied to the set-square clear of the graduated scales and a few turns of the clamping screw will then be sufficient to secure the square in place for guiding the stencils.

To enable the various parts shown in a drawing to be readily identified the individual components are each denoted by a letter which is enclosed in a small circle and an arrow is added to serve as a pointer. This circle should be drawn after the letter has been stencilled and for the sake of appearance the circle must be correctly centred.

Although the geometric centres of some letters are easily picked out by eye, others may cause difficulty; but no mistake will be made if the small drawing guide illustrated in Fig. 22 is used. This device consists of a piece of sheet celluloid or other

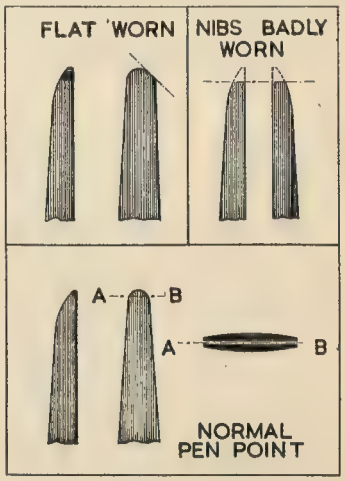
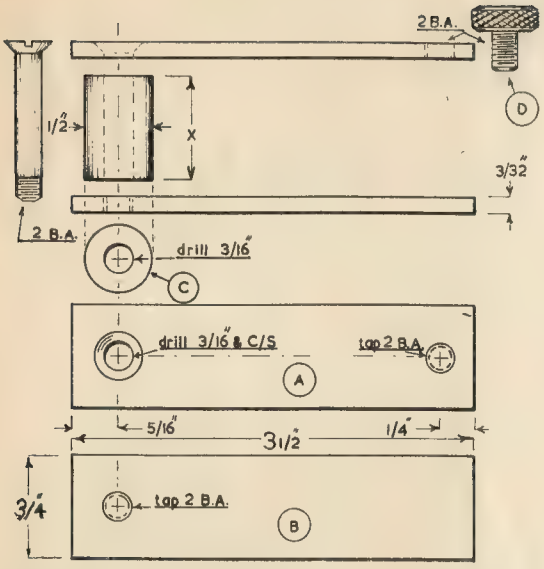
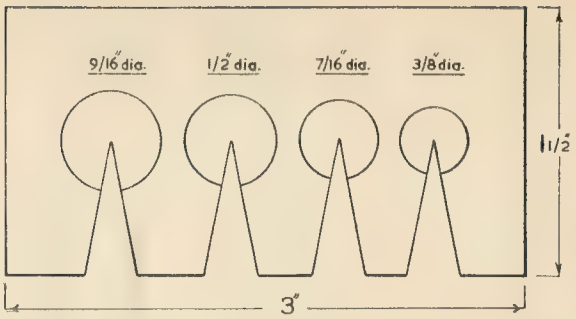


Fig. 23: Showing a worn and a normal drawing pen point



Left, Fig. 21: Constructional details of the clamp



Above, Fig. 22: The drawing guide for encircling letters

transparent material on which is scribed a series of circles of varying diameters.

After a circle of the appropriate size has been centred by eye over the letter on the drawing, the compass point is entered in the cut-out and moved upwards as far as the apex; the guide is then withdrawn and the circle is inked in.

DRAWING PENS

Apart from keeping the nibs of the drawing pens clean and free from dried ink, any material wear that has taken place at the contact points will have to be corrected if line drawing is to be carried out satisfactorily. A pen or ink compass that is badly worn will tend to produce broken or irregular lines which may be too thick despite adjustment of the nibs by means of the knurled setting screw.

After much use the point of the pen may be found to be worn in the way shown in an exaggerated form in Fig. 23 where the tips of the nibs have become thickened and flats formed at the contact areas. As depicted in the lower part of the same illustration the pen point when new has a rounded tip and the two nibs are brought to almost sharp edges where they come into contact with the drawing paper.

When the correct form of the point has been determined by examining a new pen with a magnifying glass there should be no difficulty, using ordinary care, in putting a worn pen into working order again. Although there are no doubt many different ways of sharpening drawing pens, the following method has for many years past given good results.

First the nibs should be made equal in length and given a uniformly rounded tip by following the procedure represented in Fig. 24. The pen when held in the upright position is moved to and fro over the surface of the oilstone and at the same time the handle is given a fore and aft rocking motion to remove any flats present and to impart a rounded surface to the points of the nibs.

This sharpening process will leave the tips of the nibs much too thick, so that it will not be possible to draw fine, regular lines with the pen. To thin the nibs the pen is again applied to the oilstone, but now in the manner illustrated in Fig. 25.

Here the pen, while held at an acute angle to the surface of the stone, is pushed forward and at the same time is rotated through an angle of 180 deg. in order to give the nibs the rounded shape shown in section in Fig. 23. The two sides of the pen are stoned on alternate strokes and from time to time the point is examined with a magnifying glass. The tips of the nibs must not, however, be brought to a sharp edge or the pen will tend to cut into the drawing paper.

When a satisfactory point has been obtained, any burrs formed on the inner surfaces of the nibs must be removed by opening the blades and carefully smoothing them with an oilstone slip.

Drawing pens and ink compasses made with a hinged blade that can be fully opened are more easily dealt with in this way, but the joint must be accurately fitted to give satisfactory working and dependable drawing.

When carrying out the sharpening operations it is important to use the right kind of oilstone, and for this purpose none is better than a hard Arkansas stone; for the pen will cut into and score the surface of a soft stone and this may impair the finish given to the pen point.

The small Arkansas stone illustrated in Fig. 25 measures only 3 in. and has the advantage of being housed in a wooden case; in addition to dealing with drawing pens this stone will be found useful for sharpening other small tools such as scribers and knife blades.

After the pen has been stoned, the final finish is given by closing the nibs and rubbing the points with a piece of hardened and polished steel to burnish the surfaces; a final check is then made with the magnifying glass and all grease is removed from the blades with lighter fluid. If the sharpening has been correctly carried out it will be found possible to draw either thick or thin lines with equal certainty.

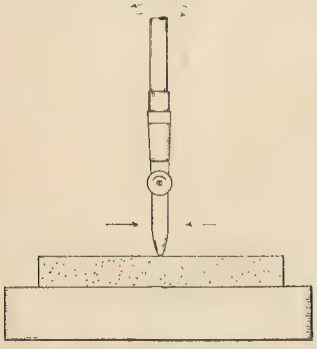


Fig. 24: Correcting a worn pen

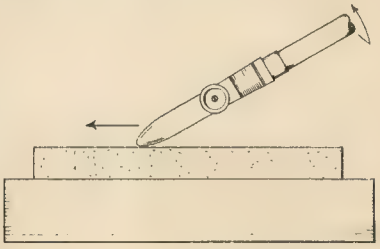


Fig. 25: Thinning the tips of the pen blades

SHIP MODELLERS' HINTS

Reader-to-reader tips to help solve odd problems

IF fine textured opaque nylon is used when making sails for model ships or yachts, there is no necessity to attempt conventional hemming of the cloth, which, particularly in the smaller scales, is practically impossible to achieve with any degree of neatness.

The nylon cloth can be both cut and hemmed in the one operation by pencilling the outline of the sail on the nylon and laying a heated needle or pin *flat* along the marking. (The needle or pin, of course, should be held by pliers and the cut made in stages.) The heat melts the nylon and, when it re-sets, seals the threads in a fine, clean line. It is then easy to sew a "rope" around the perimeter of the sail with fine stitches, which will not pull away.

I have also found when making square sails for period ship models that this method has an additional advantage insomuch that on melting, the threads become slightly drawn together, producing a very realistic "belly" to the sail and enabling cloth to be used for scenic ship model sails.

K. A. JOHNSTON.

HIGHER DRILL SPEED

I FOUND that I was unable to avoid breaking a large number of small drills in drilling the holes for the pegs used for securing the planks, and decided that some form of machine was necessary to get a higher drill speed than was possible with the drill held in a pin vice. As most of my modelling has been done at work during my lunch break electricity was out of the question, so the small flywheel drill shown in Fig. 1 was made.

The spindle was turned from a piece of $\frac{5}{16}$ in. dia. mild steel and a square filed on it to secure the flywheel. A plug was then turned to fit the bore of a piece of $1\frac{1}{2}$ in. dia. tube and drilled at its centre to be a push fit on the spindle. This was then plugged into the tube, the spindle pushed into the hole and the lead flywheel cast on to it. When the lead had cooled, the spindle and flywheel were removed from the tube and returned to the lathe where the flywheel was turned on the o.d. to $1\frac{3}{8}$ in. dia. and faced up to $1\frac{1}{4}$ in. long.

The bearing housings were turned from dural bar and the ball bearings fitted in them. The cover was parted off from a piece of $1\frac{1}{2}$ in. i.d. tube, taking care to keep the ends square, and the bearing housings secured in it by three 8 B.A. screws in each end.

If the spindle is drilled No 61 it will take reinforced shank drills with 1 mm. shanks, which range from 0.0394 to 0.004 in. dia., or small diamond-pointed drills made from 20 S.W.G. piano wire. Operation is as follows: the drill is secured in the spindle by a set screw. Then a piece of strong twine is wrapped around the tail end of the spindle, and then pulled off with a sharp action. I have found that I can drill about three or four holes 0.015 in. dia. through a piece of boxwood $\frac{1}{16}$ in. thick before the motion of the wheel is lost.

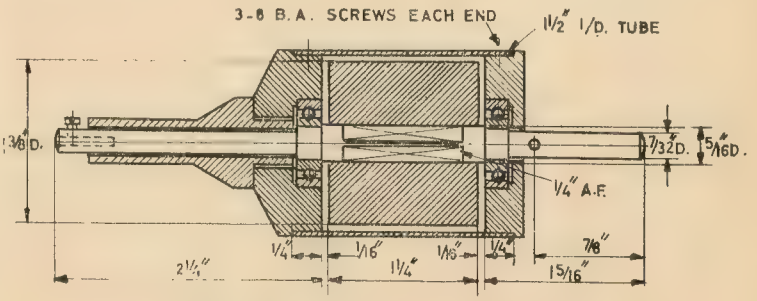
Further selections in the current competition . . . contributors are reminded that for each hint published a half-guinea book voucher will be awarded. In addition, a number of first-rate books will be donated as special prizes. . . .

MAKING SMALL DRILLS

I HAVE made small drills for use with the machine described in the following method: A piece of 20 S.W.G. piano wire was gripped in the chuck and reduced to 0.010 in. dia. by filing as shown in Fig. 2. The point was then flattened as in sketch 2b, and then the diamond point as at 2c with an abrasive stick. About 10 rubs were given to each side alternately until the point was formed. This drill comes out at about 0.015 in. dia., but I feel that smaller diameters may be obtained with care.

A GAUGE FROM DIVIDERS

A USEFUL gauge can be made from a pair of spring bow dividers by removing the points and replacing



Above, Fig. 1: The small flywheel unit

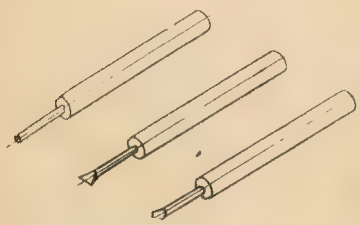


Fig. 2: Three small drills

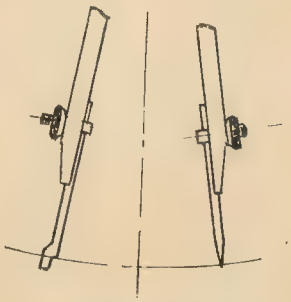


Fig. 3: The adapted gauge

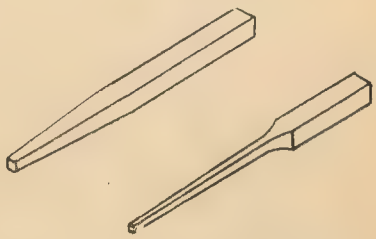


Fig. 4: Files for those small spaces

them with some made from suitable gauge piano wire as shown in Fig. 3.

One piece of wire is flattened at one end, and then filed to the shape shown. Another piece is filed to a scriber point (I prefer a chisel-type edge) and these are used to replace the original points. The cranked point is placed against the finished edge of the piece of wood and the dividers drawn along, the scriber point marking a line parallel to the edge. I have found this very useful in marking out hull planks after one edge has been trimmed to fit.

The type of divider shown with central adjusting screw is most suitable for this gauge, since the adjustment is positive and does not tend to close up against the spring.

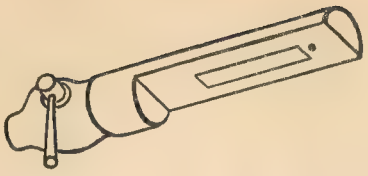
TINY FILES

FIG. 4 shows how I modified a Swiss file to clean up between small spaces. The smallest file I could get was about 3/32 in. square and I reduced this by grinding both sides and the back down until the required size was obtained. Several of these can be made from one file by breaking it into pieces and holding them in a pinchuck of suitable diameter.

H. HARVEY.

A STEAM WHISTLE

TO make a model ship's whistle which will have a realistically low note take an old mouth organ and select the reed which gives the desired tone. Next split a piece of $\frac{1}{4}$ in. bore brass or copper tube for about 1 in. of its length and remove half of it.



Above, Fig. 5: Realistic steam whistle

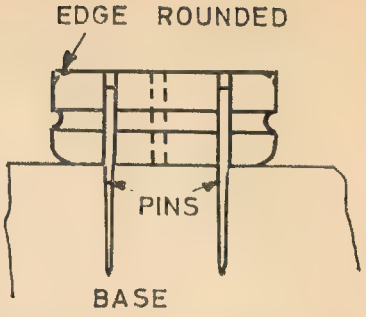
Cut a piece of sheet brass or copper to fit the tube where it has been cut, with the ends bent to seal the top of the tube and the " shelf " at the bottom of the cut. In this plate cut a slot to take the reed as in the mouth organ, and rivet the reed on the *inside* of the plate, with a small dressmaker's pin cut short. Solder the plate to the tube and attach the whistle to a small steam cock.

It is important to use a large steam pipe, say $\frac{1}{8}$ in. bore, for a boiler of 2 in. dia. 8 in. long at 30 lb. p.s.i. Generous ports in the cock are also an advantage. Adjust the reed with a pin which has its point bent over until the reed vibrates freely.

R. J. BOURNE.

ON DEADEYES . . .

WHILE building R. J. Collins's sixth-rate I evolved a method of rounding the aftersides of small deadeyes. The deadeye is made in the usual manner on the end of a dowel of suitable diameter. The lanyard holes are drilled, the face convexed with fine sandpaper, the groove for the strop cut in with a file and the half-finished deadeye is parted off with a fine saw. The problem of holding it while the flat side was rounded delayed me so I made a simple jig. Two fine pins or pieces of strong wire are tapped into a hardwood base the distance of the lanyard holes apart—they are cut off so that they are slightly less than the thickness of a finished deadeye. The deadeye is then placed on the pins so that they enter two of the lanyard holes, and it is pressed finished side down on to the base.



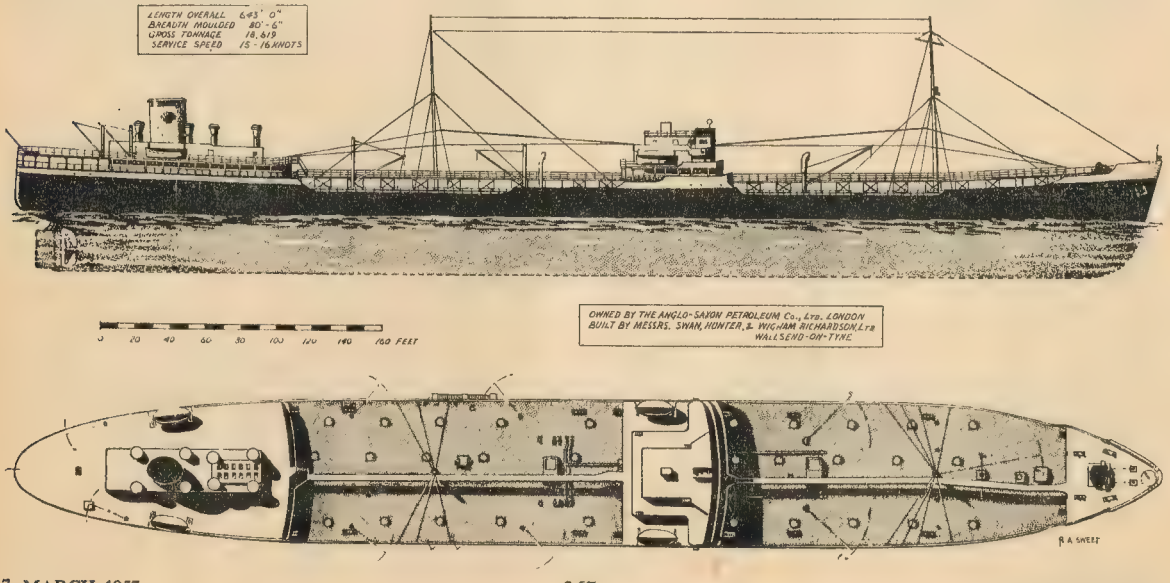
Right, Fig. 6: Rounding the afterside of small deadeyes

The two pins hold the deadeye quite firm and a piece of sandpaper held in the fingers is rubbed over the flat end, while the base is turned with the left hand so that the whole edge is rounded. Deadeyes as small as 3/32 in. dia. can be made in this way.

D. S. FIELDING.

Ship Shapes

THE OIL TANKER *VELUTINA*


LENGTH OVERALL 643' 0"
BREADTH MOULDED 80' - 6"
GROSS TONNAGE 18,619
SERVICE SPEED 15 - 16 KNOTS
OWNED BY THE ANGLO-SAXON PETROLEUM Co., Ltd. LONDON
BUILT BY MESSRS. SWAN, HUNTER, & WIGHAM RICHARDSON, Ltd
WALLSEND-ON-TYNE
0 20 40 60 80 100 120 140 160 FEET
R A SWEET

Ship modelling for beginners

QUAYSIDER now turns his attention to the various methods used in building model hulls and their respective merits

In my first article [see issue of 7 February 1957] I discussed types of boat hulls in common use and studied their different features.

Of the various methods of construction, the first which comes to mind is that of carving the hull from a solid block of wood.

Some experienced ship modellers prefer this method to any other. It is largely a matter of temperament. Some people can visualise the form of anything—be it a boat, an animal, or a human being—from a photograph or a drawing, or even from their imagination. Artists and sculptors must have this faculty. Few, if any, of the craftsmen who carved the beautiful figureheads which graced the prows of the ships of the last century worked from drawings.

For someone to see a block of wood or stone was to visualise what could be made of it, and to be consumed with the desire to carve it to the shape of his dream.

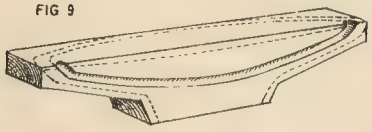
The chief difficulty these days is to find a block of wood of suitable dimensions, especially if the model is to be of considerable size. One expert ship modeller of my acquaintance still manages to get occasional blocks of yellow pine of 5 ft or 6 ft in length and about 9 in. wide by 6 in. deep, and he has built a series of magnificent working model steamers from them.

He cuts off the unwanted corners with a saw and drills out much of the inside with a large bit and brace; but the method is a rather laborious one and would appeal only to one who loves carving for its own sake and enjoys seeing his model gradually take shape from the original block.

One way of overcoming the timber problem is to build up a block from two or more pieces. Many years ago I built a shapely yacht about 30 in. long from two pieces of yellow pine 6 in. × 4 in., which I glued together along the centre-line of the hull.

This proved very convenient as I was able to draw the profile on the two adjoining faces and cut away the unwanted wood before gluing them together. The joint provided an indestructible centre-line about which to work.

FIG 9



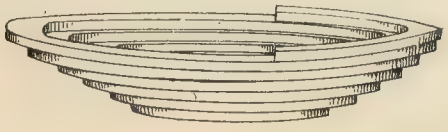


FIG. 10

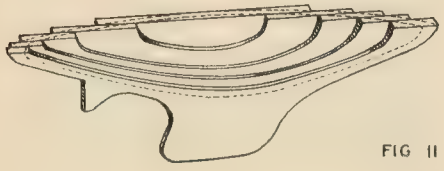
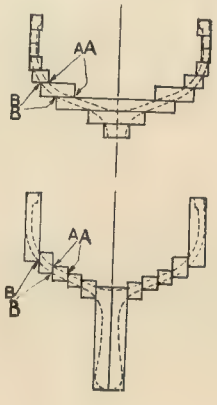


FIG 11



As a guide in hollowing out the inside I carved a groove ½ in. or more in width along the line of the inside of the hull (Fig. 9). I left the hollowing out of the hull until later to avoid distortion when the halves were clamped together after gluing. The groove formed a valuable register for the templates when hollowing out the inside.

Neither pins nor screws were used in making the joint—and though constructed nearly 40 years ago it has never come apart.

THE BREAD-AND-BUTTER METHOD

A development of the carved hull is that known as the bread-and-butter hull. In this the block of wood is built up in laminations, each cut accurately to the shape of its particular water-line inside and out. These are glued together in correct register and finally carved down to the water lines where marked *A* and *B* on Fig. 10.

The feature of the system is that when the corners of the laminations are cut away so that the angles are just disappearing, the builder knows that the form of his model is accurate to the drawing. Another advantage is that less wood is required than when carving from the solid, especially as it is often possible to cut some of the lower laminations from the inside of the upper ones.

In recent years a number of hulls have been built with the laminations arranged vertically on the buttock lines, instead of horizontally on the

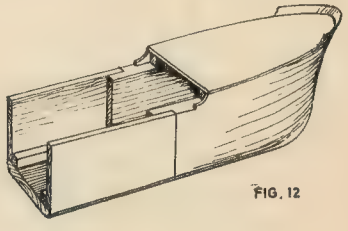


FIG. 12

water-lines (Fig. 11). For a model yacht with a fin and skeg this method has obvious advantages.

The fin and skeg can be made in one with the central laminations, and the outer laminations can in some cases be cut from the inside of the central ones. The advantage of having the lines of the hull embodied in the laminations as a guide when carving is still retained, the only difference being that the buttock lines are being used instead of the water-lines. The buttock lines are sections taken vertically through the block in a fore and aft direction, whereas the water-lines are sections taken horizontally.

Building with vertical laminations has advantages when building the hull of a model merchant ship or liner. In these types the sides of the ship amidships are vertical down to the bilges, and this squarish midship section is continued fore and aft for a considerable proportion of the vessel's length. The sides of the hull can therefore be made from one lamination each with great saving of material and labour.

When the bread-and-butter system was first introduced, waterproof glues were not available and the gluing used to be reinforced by dowels or screws. At one time the layers were sewn together with fine brass wire. However, with the introduction of the modern waterproof adhesives there is no difficulty at all; moreover the hull can be carved much thinner than when screws or other safety measures were necessary.

THE BUILT-UP HULL

A modification of the bread-and-butter system is to be found in the built-up hull. This method is useful where a reasonable proportion of the sides and floor of the hull consists of flat surfaces. Briefly it consists of the use of flat boards for the parallel sides and flat floor, fitted into wooden blocks at each end, these being carved into shape as required for the bow and stern.

For a model of a big cargo ship, liner and, particularly tanker, the method is very suitable, and can result in a considerable saving of timber—not to mention the saving of labour in its construction.

Fig. 12 shows the scheme as applied to the building of a model tanker or a vessel with a similar type of hull. The ends portions may be carved from a block of wood or perhaps more conveniently from one built up of vertical or horizontal laminations. The laminations enable one to get the lines correct at the only portion of the hull where they are difficult.

A variation of this method is depicted in Fig. 13 which shows how Sgt Coleman built a fine working

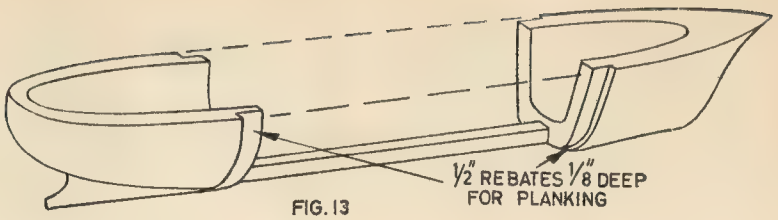


FIG. 13

model of the General Steam Navigation Company's coaster M.V. *Tern*. The hull had a well-rounded bilge and this was produced by planking the space on each side of the keel between the rebates in the bow and stern blocks.

A fairly heavy keel bar was built in to join the ends together. This was perhaps not really necessary as the planking with its bulkheads would have given the structure ample strength. This model was described and illustrated in *Ships and Ship Models* for April 1956.

A combination of this method with the bread-and-butter method was used by Mr F. W. Boyd in building the sailing model of the clipper ship *Ariel*.

This was described in the May 1956 issue of the same journal.

In this the bottom of the ship was made from a single board 1¼ in. thick. Each end of this was slotted to receive the stem and stern post. These were made of ¼ in. resin bonded three-ply. Each side of the hull was built up of four layers of 1¼ in. thick wood, and bulwarks of thin three-ply were added.

There are a number of different ways in which this method of hull construction can be applied, depending on the type of ship being modelled —and the resourcefulness of the builder.

HULLS FROM GUMMED PAPER STRIP

The gummed paper strip which, in these days, is replacing string for securing parcels, can be very useful to the beginner in making simple model hulls. It is first necessary to make a wooden former or block to the shape of the hull, finishing it off smooth with fine sandpaper.

Lay a sheet of tissue paper over it and then stretch the gummed strip across it, sticking the ends to the top of the former, viz., the side which corresponds to the open or deck surface of the hull, and which, of course, is solid in the former.

The strips, which should not be more than ½ in. wide, should be gummed criss-cross over the earlier layers until the whole is evenly coated with three or four—or even more—layers. The strips should be pressed firmly on to the formers, especially on the concave surfaces. Each layer should be allowed to dry before the next is put on. It will be found that by so doing the shell will retain its form after its removal from the former.

To remove the shell insert the blade of a sharp knife under the strips which were stuck across the top of the former, slicing through the shell along the top of the gunwale. The tissue paper prevents the strip from sticking to the rest of the former.

The thin portion representing the keel, stem and stern post can be reinforced by wood strip pressed in and glued in position on the inside. One or two bulkheads, light wooden gunwales along the top edge, and a rubbing strake along each side, give the necessary rigidity, and complete what can be a very attractive model.

This, of course, gives only the germ of the idea. Several builders have elaborated on this method very considerably, and a number of good examples has been demonstrated at Model Engineer Exhibitions and described in these pages.

The hard chine type of hull mentioned last month offers great possibilities for a simple model suitable for the beginner. Many young model-makers start by making model aeroplanes, and the technique used is very applicable to the construction of a hard-chine boat hull.

● *To be continued.*

FOR SHIP MODELLERS

John N. C. Lewis, in *Ship Modeller's Logbook*, has produced the ideal book for the enthusiast. He shows the reader how to make simple, decorative, miniature and scenic models, including a clipper ship in a bottle and an Arabian Baggala.

There are details of clench and carvel built models, and the text is enlivened by stories of eighteenth century smuggling and the work of the Revenue Cutters.

Obtainable from Percival Marshall and Co. Ltd, price 12s. 6d., postage 1s. (U.S.A. and Canada $3.00).

READERS' QUERIES

Do not forget the query coupon on the last page of this issue

This free advice service is open to all readers. Queries must be on subjects within the scope of this journal. The replies published are extracts from fuller replies sent through the post: queries must not be sent with any other communications: valuations of models, or advice on selling, cannot be given: stamped addressed envelope and query coupon with each query. Mark envelope "Query," Model Engineer, 19-20, Noel Street, London, W.1.

Model traction engines

I would appreciate information on:

1. The ability of model traction engines to haul passengers in a manner similar to that of the model locomotive, but without tracks of course.

2. The names and addresses of firms supplying plans and castings for traction engines larger than 1½ in. scale.

3. The relative amount of work involved and skill needed to construct a model scale traction steam engine as compared with the average locomotive in the same size scale. Naturally the locomotive would be much larger in the same size scale.—W.F.W., Miami Beach, Florida.

▲ 1. *Even a 1 in. scale traction engine will haul its driver quite easily. It will perform quite well on a surface such as a concrete or asphalt path, but due to its small size it will not function so well on a gravel path. Larger engines will run on any surface, and the loads they will haul are roughly in proportion to the scale of the model. A 2 in. scale engine, however, has been known to haul six adults with ease, and could probably manage more.*

2. *Only one English firm is on record for supplying plans and castings for a traction engine larger than 1½ in. scale. This is Dick Simmonds and Co., 5, South Road, Erith, Kent, who supply castings and plans for a very fine model of a Burrell showman's engine named* THETFORD TOWN. *The design is by Mr Ronald Clark, who is known as one of Britain's keenest traction engine enthusiasts.*

3. *The relative amount of work involved and skill needed to construct a model scale traction engine is about the same as is required for the average steam locomotive. Two such engines are broadly similar so far as the working parts are concerned, the only difference being in the arrangement of those parts.*

Crankshaft machining

Can you tell me of a method for turning the crank on the main spindle of the small steam engine *Cygnet* described by Edgar T. Westbury? I do not possess a special angle-plate. But I understand the eccentric gadget is made.

In addition, can you refer me to a description of a crosstube centre flue boiler and spirit lamp—or blow-lamp?—A.C.M., Farnborough, Hants.

▲ *The usual method of machining overhung cranks of this type is by the use of some form of eccentric turning fixture. The Keats V-angle plate was recommended in the article for this purpose but an ordinary V-block, mounted on a standard angle-plate, could be employed.*

An alternative method of turning single-throw cranks would be by marking out and drilling centres for both the main journal and the crank throw on the two ends of a piece of bar of suitable diameter for the crank web. The main centre must necessarily be drilled to a sufficient depth on the crank pin end to avoid being machined out in the offset turning operation, which must be done first. A series of articles giving full details of all methods of machining or constructing crankshafts was published in the issues of MODEL ENGINEER *dated 21 March, 18 April and 2 May, 1946.*

As to a crosstube centre flue boiler, a complete description of a boiler of this type has not been given in recent years. But the TRIDENT *internal flue boiler, which has two return tubes and crosstubes in the main flue tube, would possibly suit your purpose. However, internal flue boilers are not suitable for firing by the usual type of spirit lamp. A torch type of blowlamp, preferably working on petrol or paraffin, is best suited for this type of boiler.*

Suitable engine

Can you tell me if drawings can be purchased to make a multi-cylinder i.c. engine suitable for model cars and whether any firms sell castings or parts for this type of engine? The engine must be slow-running as I intend to use it in a large model, possibly a model lorry or bus.—D.J., Newcastle upon Tyne.

▲ *A great deal depends on the size of car you wish to produce, but for a car of about ⅛ in. scale, or 1½ in. to the ft, the* SEAL *15 c.c. engine would be suitable. This engine can be controlled over a very wide range of speed and closely resembles the full-size motor car engine.*

Drawings for this engine can be obtained from the Percival Marshall plans department, price 5s. (Ref. No. P.E.20) and castings can be obtained from Craftsmanship Models Ltd, 27, Circle Gardens, Merton Park, London S.W.19.

Vacuum pump

I have recently bought a vacuum pump. The specifications are: 37 J/ 53 Pt No C/ 393; Pump Vac Romac; Type B 3 M.K. 111.

Can you give me any information on the following.

1. The pump contains oil, D.T.D. 578. This must be removed before using. Must I then replace with a small quantity of oil or is the machine run dry?

2. Can a speed of 1,450 r.p.m. be increased to produce a quicker vacuum or would excess speed be inadvisable?

3. There is a special direction of rotation. Which is the direction?

4. Two arrows on the machine end point to two openings on the top surface. Both arrows state "inlet." Is this corect or is one "inlet" and the other "outlet."—J.E.H., Queenstown, South Africa.

▲ 1. *Assuming that the pump is to be used as a vacuum pump it is possible to keep a fairly large quantity of oil in circulation, as there is no objection to oil vapour being discharged with the air. But should the pump be used to produce air pressure it may be difficult to extract the oil from the delivery line and, in such cases, it is generally found best to regulate the quantity of oil to the minimum on which the machine will run properly without danger of seizure.*

2. *It is possible to run these pumps on speeds up to about 2,500, but both cooling and lubrication become more difficult at the higher speeds.*

3. *Most pumps of this type can be run in either direction and the port connections can be used either as inlet or discharge, but in some cases altering the direction of rotation may affect the lubrication system.*

4. *The arrows on the end plate of the machine presumably indicate the direction of rotation in relation to the inlet port.*

Making music

Can you tell me the formula employed in setting out the tunes on the cylinder of a musical box? I am hoping to make a block movement to play tunes and chimes.—H.C., Halifax, Yorks.

▲ *First of all set out on paper a musical notation; include staves, to denote the pitch of the notes, and vertical divisions, which form a time base. As it is not possible to indicate time by the distinction in the notes themselves, however, this is done by varying the distance between them.*

Setting out tunes on a cylinder in this way is quite complicated and requires extreme precision in drilling the holes and fitting the pins and, so far as is known, very few amateurs have ever succeeded in doing this satisfactorily.

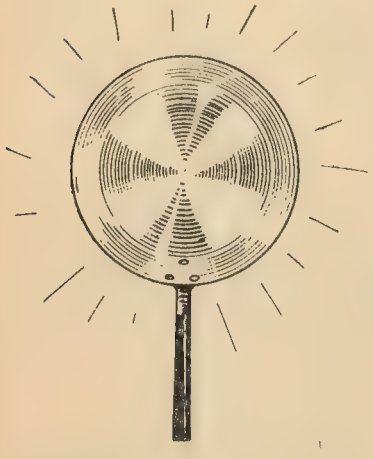
Theory of light

My problem concerns the theory of light. For many years I have been interested in optics and have made many telescopes. I understand the laws of reflection and refraction, but there is one particular form of reflection which puzzles me and which I have never seen explained or even referred to in any book on physics or optics—I refer to the sector-shaped wings of light seen on discs such as gramophone records, revolving wheels, the wiped portions of motorcar windscreens and even on polished pots and pans [see sketch]. It is puzzling why they should take this sector shape, which changes in size and position with every movement of the eyes or the surface or the incident light. Can you give me an explanation?—S.G.J., Swansea.

▲ *The phenomenon of reflection on polished surfaces follows the simple physical law of reflection, but due to inaccuracies in the flatness of the reflecting surfaces the reflections of highlights tend to produce geometric forms. In the case of the frying pan, the surfaces, although brilliantly polished, are not dead flat but are usually in a series of circular waves. It will be noted that in any of these surfaces shifting the view point will alter the shape and position of the reflections, as with any other kind of reflected light.*

It is, of course, possible to get peculiar phenomena in both reflection and refraction when polarised light is involved, but this subject is extremely complex and could not be dealt with in a brief reply. However, a book "The Universe of Light" by Sir William Bragg gives a good deal of information on the peculiarities of refraction and reflection.

It is not known whether this book is still in print—it was published in 1933 *—but you would probably be able to borrow a copy from your local public library.*



Type of reflection from polished surfaces

Two-purpose compressor

I want a compressor to do two types of job—*a* provide enough air for a big gas-air blowtorch, say 1 in. nozzle size and, *b* work a spray for paint, insecticide, etc. Can you tell me whether this work can be done with one outfit, and what capacity and pressure I should look for in equipment?

I only want the air supply for the air-gas blowtorch for occasional use so perhaps it would be better to use a cylinder of either oxygen or air.—J.S.S., New Malden, Surrey.

▲ *Generally speaking the two purposes—referring to the likelihood of a compressor serving a dual purpose—are incompatible. For the first calls for a large volume of air at a low pressure and the second for a much smaller volume of air at a higher pressure. This applies to the use of the usual types of spray equipment—though it is possible to work with lower pressure and greater volume by using specialised types of spray guns.*

For the purpose of operating an air-gas blowtorch a rotary type of blower is recommended. There are several types of these blowers available on the surplus market which could be adapted for the purpose without a great deal of difficulty. They should preferably be run at approximately 1,500 *r.p.m., so that they can be direct coupled to a normal type of motor of about* ½ *h.p.*

For high-pressure paint spraying, a reciprocating type of compressor is generally used, running at a speed of 700-800 *r.p.m. and for the standard type of spray gun a capacity of about* 3 *cu. ft. per minute is recommended for continuous duty.*

As to the use of a cylinder of oxygen or air for operating the blowpipe, this would not be so useful or convenient as a blower—and there are difficulties at the present time in obtaining high-pressure oxygen or air in cylinders for use in amateur workshops.

BROWSING AMONG THE P.M. BOOKS

ONE of the Trustees of the National Maritime Museum, which has now been open to the public for just 20 years, is Dr R. C. Anderson, who lives very conveniently at Greenwich. No one alive knows more about the rigging of ships in the seventeenth century. Indeed, no one knows so much—as was proved by the reception given throughout the world to the definitive work which he issued on this subject in 1927, 10 years before the Museum was established.

Maritime history in all its many aspects commands an enormous interest throughout the United States and especially on the East Coast where the traditions of the Old World and the New mingle in the tang of the waterfront. It was the Marine Research Society of Salem which published Dr Anderson's classic *The Rigging of Ships in the Days of the Spritsail Topmast* 1600-1720. Ship modellers and other students of the period welcomed this work with such enthusiasm that soon there were no copies left, except in the second-hand market at a collector's price.

Between that time and the present the National Maritime Museum has added steadily to its riches, and with all these treasures at hand—models, pictures, drawings, plans—Dr Anderson has been able to improve on his great achievement of 30 years ago. His *Seventeenth Century Rigging* (Percival Marshall, 25s.), a handbook for model makers, provides the fruit of that long, patient, careful, loving study which has earned him an honoured place as president of the Society for Nautical Research.

The original drawings have been re-done in the form of large prints which open out, and some new prints have been added.

To those who do not model ships *Seventeenth Century Rigging* is yet another reminder of what the historian owes to this admirably civilised craft. No manuscript or painting can have quite the value of a model exactly reflecting the thing itself.—**J.M.**

POSTBAG

The Editor welcomes letters for these columns, but they must be brief. Photographs are invited which illustrate points of interest raised by the writer

ROUNDABOUT CENTRE

SIR,—Recently there have been requests for details of three-abreast roundabouts, with, if possible, a picture of a centre truck.

Here is the photograph of such a truck with the side panelling removed which gives quite a lot of useful information about the general arrangement of parts. Anent the comment [Smoke Rings, January 31] about the buck-eye coupler being a safeguard against telescoping, and the apparent apathy here to that fact, the modern steel coach does much to prevent the fatal override no matter how it is coupled.

Telescoping only comes to coaches with light wooden bodies built on to heavy steel frames—this being the standard construction method of the early days. In collision the frame of one vehicle would jerk up and ride over the frame of its neighbour, generally shearing away its own superstructure and that of the invaded coach in the process.

With steel stock, irrespective of coupling method, the tendency, as proved by quite a number of crashes, is for the coaches to zig-zag, but not close in on one another. This does not mean that the buck-eye coupler is not a great help, but the behaviour of American wooden stock, buck-eye fitted, in crashes of some years ago shows that it is not everything.

Actually the zig-zagging of vehicles is much safer for passengers at certain speeds than the sudden stop of a more rigid train.

The preventing of the over-ride has engaged minds down the years and at one period the Chief Mechanical Engineer of the Great Central Railway (Mr J. G. Robinson) fitted rigid blocks to the ends of his coach frames, these being firmly anchored to the longitudinal members.

They were intended to engage in collision and so prevent one frame riding up over the next. The idea proved itself in several medium speed mishaps but I do not think it was ever put to the test in any really high speed smash.

Cheshire. H. A. ROBINSON.

Centre truck of three-abreast roundabout with panels removed. See "Roundabout Centre"

ENGINES IN WALES ?

SIR,—I wonder if any reader in North Wales knows the whereabouts of any traction engines, portables or steam lorries standing idle or being worked in their locality ?

Also, does any one know of a fair with a showman's engine that visits North Wales or the bordering counties during the summer months ?

Anglesey. J. HUGHES JONES.

CHANNEL CROSSING

SIR,—A rather misleading inference is made in the statement "when I sailed a 5 ft model boat from Dover to Calais . . . ." [Channel Crossing by Radio Control, January 31] attributed to E.B.

I should like to point out that the conception and execution of the crossing was done by me. It was sponsored by Electronic Developments Ltd. My contribution before I actually controlled the model over the Channel, was over 12 months' designing of the radio equipment (the forerunner of the present ED reed equipment) and the model.

Other tests were a 15 mile run from Richmond to Westminster, and the first saltwater tests of six miles out to sea at Fleetwood. It is not easy for others to realise the amount of work and worry which were put in and suffered before the final nine hour run.

Richmond, Surrey. G. HONNEST-REDLICH.

● *We endorse the remarks of Mr Redlich. He himself knows E.B. well enough to realise that he would be the last person to claim credit which is due to others. Actually the "I" in the original note was intended to read "we."*—EDITOR.

STEAM CAR NEEDED

SIR,—On April 13 we are holding our annual rag in aid of the Imperial Cancer Research Fund, but because of the fuel situation we are experiencing difficulty in obtaining transport for the procession.

May we appeal, through MODEL ENGINEER for anyone who can help us with steam or electric transport.

Acton Technical College Students' Union, High Street, Acton, W.3. E. A. RUDOLPH. (Rag Committee, Transport Organiser)

SWEEP IT UP, DAD!

SIR,—I came out to this country in 1910 after serving my engineering apprenticeship in Bristol, and I was one of the founders of the Durban Society of Model Engineers in 1911, I now have the honour to be its president.

Although I have been a constant reader of MODEL ENGINEER and I have built many working models both steam and petrol driven, I have never in my life built a locomotive. I have always considered a well-turned out 3½ in. gauge passenger-hauling steam locomotive as the most popular and attractive job to build.

For me its rather late in the day now to make a start and so this project has fallen to my youngest son Kelvin now 17 years of age, and who only last week left the family nest to become an apprentice with the Bristol Aeroplane Co. at Filton. Kelvin has been a junior member of our Durban club since he was 12, and has made good use of his Dad's home workshop. In the D.S.M.E. he was a most enthusiastic member among the older live steam chaps.

After cutting his teeth on one of Mr Westbury's i.c. engines and other jobs he decided two years ago to have a go at *Maisie*, and with L.B.S.C.'s "words and music" and a set of Kennions wheel castings he got under way, making his own patterns for cylinders and boxes which a local foundry cast for him.

I have spent many happy hours watching him on the job in my workshop, but apart from suggestions on tool set ups I never dared to help, much as I was itching to turn up a few axles, or wheels. No! Dad has been relegated to "holder up" and cleaning down the lathe (a common labourer!).

So Kelvin has packed his toolbox and his unfinished *Maisie*, which he hopes to complete when he has settled down in England, where he hopes to get screws and bits and pieces of material which are well-nigh impossible to obtain in South Africa.

Natal, H. V. KELLAWAY.
South Africa.

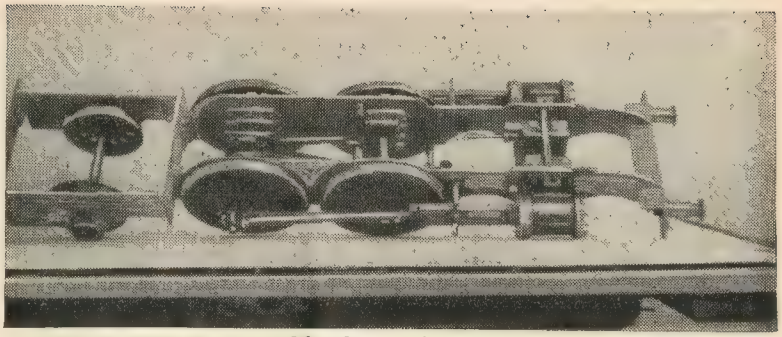
COLLIERY ENGINES

SIR,—The correspondence relating to the Haigh Foundry has been of particular interest to me since four pairs of winding engines constructed there are operating in this district—one at Steetley Colliery, two at Shireoaks Colliery and one at Manton Colliery. The Steetley and Manton engines are horizontal, the Shireoaks vertical and are almost identical to the engines used at the Crawford pit of the Wigan Coal and Iron Co. at Aspull, near Wigan, now dismantled.

I wind occasionally with the engine at Manton. It is quite small approximately 4 ft stroke by 20 in. bore cylinders. The drum is 12 ft dia.

The engine is installed at a pumping shaft just over 100 yd. deep and is used for getting pump men to and from the levels where the pumps work. Quite a lot of water comes up this shaft; 4,500,000 galls every 24 hours. I understand that these engines will be scrapped in the near future under an electrification scheme.

Worksop, Notts. W. SOUTHWORTH.



The chassis of MAISIE. *See "Sweep it up, dad!"*

THE STEAM-ENGINE

SIR,—For some years now I have been reading MODEL ENGINEER; not so much on account of an interest in model making, but because of my interest in steam-engines. MODEL ENGINEER appeared to be a magazine that catered for such an interest.

I have come to realise, however, that there is a radical difference between the attitude of the magazine and my own attitude towards the steam-engine. The recent correspondence in Postbag, and the mud-slinging references to "dirty diesels" has added to the impression that those who write in MODEL ENGINEER believe the steam-engine to be a spent force in transport.

The models described, week after week, in the pages of MODEL ENGINEER, are either scaled-down versions of existing and past engines or they are built with a rigid adherence to the established principles of steam-engine design.

Does nobody ever try to build engines of a type that has *not* been built before? Is there anybody, anywhere, who carries out some basic research on steam power? If there are people engaged in such activities, why do they not write of their research in MODEL ENGINEER?

The steam-engine offers wide scope for further development and those who build model engines could make a valuable contribution to the future of steam power. However, these people continue to live in the past and to bemoan the demise of the steam-engine in railway transport.

Some of the live steamers should glance through the model aeroplane magazines; there they will find a sphere where new ideas are siezed upon eagerly, and experiment is constantly afoot.

Dublin. J. L. HARDEN.

No 1 AT MOORGATE

SIR,—With reference to the query raised by Mr T. S. Lascelles about the original No 1 City and South London Railway locomotive, I am given to understand that it now stands in Moorgate Station, jacked up on baulks of timber.

I asked London Transport when I was on their staff whether it would be possible to have this painted in the original livery and they promised they would do this as soon as convenient.

Leytonstone, E.11. A. C. MAYCOCK.

● *As we go to press the fate of this historic locomotive is under consideration by London Transport.*—EDITOR.

18 AND 60 POUNDERS

SIR,—The letter from Brigadier Richards [Postbag, February 7] concerning the 18 pounder gun aroused old memories. The brigadier is quite correct. The gun modelled is a very early edition of the 18 pounder.

In its later guise with the split trail it was able to get around some of the defects which your correspondent refers to. The run up with springs which existed for a long time (too long for some of us) was a serious defect. The 60 pounder which I knew well had the same defect.

I spent a lot of my time on the 6 in. 30 cwt and 8 in. weapons which, when first issued and for ever afterwards, were equipped with the hydro-pneumatic recuperator. Working properly it was a joy to use.

We had the same trouble as your correspondent with the pressure chamber joints—leather, rubber and canvas, and fibre washers split after

POSTBAG . . .

a few rounds, covering the crews with oil. Later on (and I was intimately concerned with these experiments) we made some washers out of raw hide which completely cured the trouble. In all my experience with the 8 in. howitzer, I never knew one of these washers to give out.

Stogursey, Somerset. WM. R. ARMSTRONG, (Sd.-Lieut R.G.A.)

MISLED BY HANDBOOK

SIR,—I should like to thank Brigadier Richards for his interesting letter [Postbag, February 7].

My reason for dating the 18-pounder as 1917 was that the title page of the official instruction book reads "Handbook of the 18 Pr. G.F. Gun, Land Service, 1915 (reprinted 1917)." I assumed that the gun, as shown therein, was still the current type when the handbook was reprinted, not realising that a later version was actually in service.

Externally the model is a replica of the prototype illustrated in plates V and VI of the handbook, both of which are indicated as Mk 1. Also, the text describes (and illustrates) a hydraulic buffer with running-out springs, but no mention appears to be made of a pneumatic recuperator system.

Wembley Park, Middx. S. A. WALTER.

LOCOMOTIVE DESIGN

SIR,—Locomotives I Have Known is one of the most attractive series features in MODEL ENGINEER. Referring to the S.E. and C.R. class F [February 7] I think that there is an error in the given wheelbase dimensions.

These are given as 23 ft 9¼ in. overall, made up of 5 ft 4 in. + 9 ft 10¼ in. + 8 ft 6 in. The error lies in the 9 ft 10¼ in. which presumably is the distance from the bogie *pivot* to the driving-wheel. I think the figure should be: total wheelbase 20 ft 11¼ in. made up of 2 ft 7 in. (this allows for the 1 in. out of centre pivoting of the bogie) + 9 ft 10¼ in. + 8 ft 6 in. Incidentally, with only 9 ft 10¼ in. (presumably) from cylinder centre to driving-axle, the connecting-rod centres must have been rather short relative to the 26 in. stroke. I wonder if Mr Maskelyne could give us the dimension of these?

Referring to the G.W. Dean Singles I find myself to a large extent in agreement with the sentiments of Mr R. E. Vinning, particularly do I agree with what he says of the Midland Singles, though personally I should choose the Princess of Wales class as the acme of beauty and balance.

I have always regarded the late Samuel Waite Johnson as the greatest artist in locomotive design in British railway history.

Beauty in locomotives to an extent lies in the eye of the beholder; some people are obsessed by Stroudley's engines as the most beautiful ever. They were splendid engines, as engines; probably as good as any of their period, but to me at least they were unsymmetrical with their rather footling little domes perched far back on the boiler barrel, and their gaudy livery was more suited to a hot potato engine.

Rustington, West Sussex. K. N. HARRIS.

LUBRICATOR

SIR,—We were interested in Mr Westbury's description of a displacement lubricator [February 7, page 198] for it is obviously based on the one we introduced somewhere between 1924 and 1928 (we have forgotten the precise date); unfortunately the control valve by itself will by no means control the rate at which oil passes to the cylinder. You can shut it off altogether, but open it the slightest crack, and the oil may feed much too fast.

What really matters is the temperature of the body of the lubricator. If it is attached to the steam-pipe, away from the engine and exposed to all the winds of heaven, steam will condense rapidly, oil will be displaced equally rapidly and the lubricator will soon be emptied of oil.

On the other hand, if the lubricator be fitted close to the steam-chest so that it is kept warm, steam will condense at a much slower rate. Carried to extremes—a steam-jacketed lubricator would not function at all!

To quote a practical example. A short while ago we provided an engine with this type of lubricator. It was on the steam-chest with a thick asbestos washer to make the joint. We were getting too much oil so we changed the washer to a copper one; then oil consumption was about right. Generally, the lubricator should be kept thoroughly warm.

The great advantage of a displacement lubricator, besides its simplicity, is that oil is entering the cylinder all the time at an even rate and, furthermore, there is no corrosion even if the engine be left standing for months.

By the way, we find that the best way to provide a steam-tight joint for the filler cap is to turn a knife edge on the underside of the cap and a corresponding V-groove in the top of the body. Fill the groove with solder and the knife edge indenting the solder will form a perfect joint, much better than a washer.

Stuart Turner Ltd, Engineers, Henley-on-Thames, Oxon. H. SANDERSON, (Director)

● *E. T. Westbury writes: I was careful to say that my design as published was not original, though I was under the impression that the origin of it went a long way further back than* 1924.

Mr Sanderson's comments with reference to keeping the lubricator at a fairly high but not excessive temperature agree entirely with my own experience.

EXPERIMENTS WITH PIE

Young Trig was just mad about pie,
After eating he heaved a great sigh,
And exclaimed as he stared,
"Now I feel πr^2,
Is an area good to the eye."

But from eating nought would him deter,
And a second he ate, my dear Sir,
Then calmly he stated,
(His hunger abated),
"My circumference is now $2\pi r$!

* * *

Now he hopes that his hard work'll
Let him fully "square the circle,"
Though he knows it's consequential,
His calculus is differential!

Co. Wicklow. M. K. HUGGERT.

THE DEAN SINGLES

SIR,—If I might butt in again about the appearance of these locomotives, I should like to join issue with Mr Vinning. It is a matter of opinion as to whether one thing is more lovely looking than another, but there is one very important thing here—Mr Maskelyne and myself have both seen these locomotives in their glory; my first view of one of them was in Exeter station in 1894 and its appearance made everything else look very second rate.

I do not believe this beauty of line was anything but an accident, nothing else of Dean's design came anywhere near them, the Midland Singles were admittedly designed for looks, but they never appeared to me to be quite right, the 7 ft 4-4-0s were Johnson's beauties.

If Mr Vinning did see these Dean Singles in the flesh, well he just does not think much of them, but if he has not seen them he really is not in a position to judge.

Bexhill-on-Sea C. M. KEILLER.

★ ★ ★ CLUB NEWS ★ ★ ★

Edited by THE CLUBMAN

MEMBERS of the Model Power Boat Association at their annual meeting in London were delighted with their first view of the handsome silver cup which radio-control enthusiast H. J. Taplin has presented as a speed contest award. The cup will be known as the Taplin Challenge Trophy for radio-controlled speed boats and—as already reported in Club News—will be open for international competition.

With Edgar T. Westbury of MODEL ENGINEER presiding, the meeting gave its approval to the six new provisional rules listed here on January 10.

Treasurer J. H. Benson, who is also the competition secretary, reported that the funds were well maintained. Last year's additional outlay on badges had been largely recovered. Most of the first order had been sold and more was about to be ordered from the makers.

The M.P.B.A. is opening an international fund to help with the expenses of overseas competitors at events in Britain and also perhaps, in the future, of British competitors going abroad. Contributions are invited from any person or organisation interested in furthering the international competition of model power boats.

This appeal will, I hope, bring a ready response from MODEL ENGINEER readers who enjoy the comradeship of fellow-enthusiasts in other countries. The international rallies inspired by the M.P.B.A. are a source of energy to the whole modelling movement. They bring the enthusiasts together in a friendship without frontiers, and they also provide events of great interest to the general public.

The M.P.B.A. officials were re-elected *en bloc*: Edgar T. Westbury president, Sir Robert Bland Bird, Bart, K. G. Williams and J. F. Croll vice-presidents, P. Lambert chairman, A. A. Rayman vice-chairman, J. King (309, Days Lane, Sidcup, Kent, Bexleyheath 5872) general secretary, J. H. Benson (25, St John's Road, Sidcup, Foots Cray 7428) competition secretary and treasurer, and J. Slender and S. Poyser auditors.

REMINDER FOR ELTHAM

It is Bits and Pieces at the Beehive tonight. Frank H. Bradford, the secretary of **Eltham and District Locomotive Society**, writes to me from 19 South Park Crescent, London, S.E.6, asking the members to make an effort at bringing along some of their current work so that a number of discussions can arise on method and procedure in workshop practice.

Applications for the portable track at garden fetes and other events are beginning to arrive, and the club's stud of locomotives will again be out and about for the season. Visitors are always welcome at the meetings of this friendly and ever-active club.

M.E. RATES . . .

(Continued from page 369)

This, on the face of it, is considerably more generous. Whatever hope may be found for the affected clubs resides in their ability to prove that they benefit a *sufficiently wide section* of the community.

Can they do this? It is impossible to say; but one suspects that the "public character" approach, on the line of benefiting a wide section of the public, was taken by the fortunate bowling club. Confronted with the kind of Act which has additional provisions broad enough to modify the whole, one is wise to take nothing for granted—like the excellent Mr Wilson who did not let himself be satisfied even with advice from a reasonably authoritative quarter.

The opinion of a lawyer must of course be given due value; but the Act still appears to be capable of both a narrow and a broad interpretation; which is why I have had to set out two contrary arguments.

Perhaps, then, before looking for a kind lawyer in the model engineering movement, the interested clubs should find out what local organisations have obtained exemption and on what grounds. If a bowling club can equip itself with a public character, why not a model engineering club with an open-air track, an ability and readiness to delight hundreds of children, a power to assist every good cause by highly special and attractive means unique in the community, an interest in youth and a close friendship with schools, and—behind all this—a general devotion to civilised interests and to skills which this nation needs to develop as never before since the First Industrial Revolution? ▣

M.E. DIARY

March 7.—Hitchin and District M.E.C. "Some of My Best Photographs," O. Wilman and the Frost brothers. Eltham and District L.S. Bits and Pieces, Beehive, 8 p.m.

March 9.—S.M.E.E. chairman's inaugural address, 14, Rochester Row, London, S.W.1., 2.30 p.m. Manchester M.R.S. 32nd birthday: "Mid land Railway," G. Dow, College for Adult Education 2.30 p.m.; annual dinner, Carlton 6 p.m.

March 10.—Manchester M.R.S. birthday celebrations continue, Manchester (Victoria) School of Signalling, 10.30 a.m.

March 11.—Clyde Shiplovers' and Model Makers' Society, "The Cruise of the Miranda," William Work (illustrated). I.E.E. Education Discussion Circle ("Commutation"), tea 5.30 p.m.

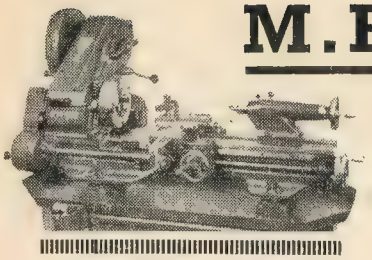
March 12.—Glasgow S.M.E. at Schoolboys' and Schoolgirls' Exhibition, the Kelvin Hall, standard 200 ft 5 in. gauge track (March 12-23). Bristol Ship Model Club annual meeting. I.M.E. Automobile Division, 6 p.m.

March 13.—Birmingham S.M.E. Lehman and Picknell Cup competition.

March 14.—Liverpool N.R.S. "The Holt Fleet," Professor F. E. Hyde of Liverpool University. Hull S.M.E. selection of models to be reconstructed by members, in lecture form, Trades Labour Club, Beverley Road, Hull. South London S.M.S. club night. Edinburgh S.M.E. club night.

March 15.—Birmingham Ship Model Society, exhibition of nautical-interest photographs, 7.30 p.m. Port Talbot, Neath and District S.M.E. film show.

M.E. COMPETITION



BE the Editor of MODEL ENGINEER for a day! That is the invitation which is extended to all readers with a competition in which their judgement as Editor will be put to the test. The prize in this simple but intriguing competition is a

MYFORD SUPER SEVEN LATHE

CONDITIONS OF ENTRY

1. The judges shall decide the order of priority and decide the award of the prize.
2. All coupons will be scrutinised and no claim is necessary. Proof of posting will not be accepted as proof of delivery and no responsibility can be accepted for entries lost, delayed, or damaged, before or after delivery.
3. Closing date for the competition is first post on Friday, 5 April 1957.
4. Employees and the relatives of employees of Percival Marshall & Co. Ltd, and associated companies are not eligible.
5. Any question arising out of, or in connection with, the competition will be decided by the judges and their decision must be accepted as final and conclusive. No correspondence can be entered into.
6. Mutilated or altered entry forms will be disqualified.

Listed below are the headings of the principal contents of MODEL ENGINEER. Put them in what you consider is the order of interest and importance to readers by placing the letter against each section in the appropriate column on the coupon. For example, if you think the articles in category E come first, place an E against 1st in number one column and so on.

A panel of judges, balanced in their interests, will be set up by the Editor of MODEL ENGINEER and the entrant who submits the coupon which is nearest to the judges' verdict will be awarded the prize. The coupon will be repeated for two more weeks; the closing date will be Friday, 5 April 1957. Entry is free and any number of entries may be submitted, but each must be on the printed coupon which must be fully completed.

A. **Model locomotives.**—Their construction, maintenance and running. Descriptions of models which have been built.

B. **Railways and locomotives.**—Features on modern locomotives and railway practice in different parts of the world.

C. **Railways, historical and unique.**—Articles on great locomotives of the past and of lines, systems and practices no longer or little used.

D. **Model traction engines.**—Constructional series and articles on models which have been built or exhibited.

E. **Traction engines, prototype.**—Articles on types of machines which are or have been in use; reports of rallies and traction engine events.

F. **Model steam-engines.**—Articles describing how to build model steam-engines. Descriptions of how they have been built.

G. **Model power boats.**—Reports of regattas up and down the country and abroad. Operational hints. Descriptions of outstanding craft.

H. **Workshop practice.**—Advice on difficult procedure in home workshops. Constructional features on how to build accessories and tools.

J. **Model ships, historical.**—How to build such models as *Myrmidon*; also descriptions of models in museums and exhibitions.

K. **Model ships, modern and power.**—How to construct models of liners, tugs, etc., and the power plant by which they are driven.

L. **Working model yachts and full-rigged sailing ships.** Construction and operation. Regattas.

M. **Clocks.**—How to build clocks and accessories for them. Repairs, etc.

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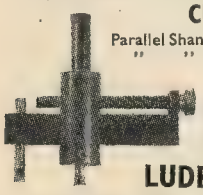

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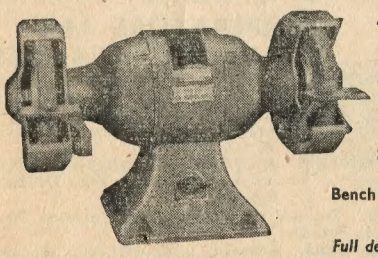

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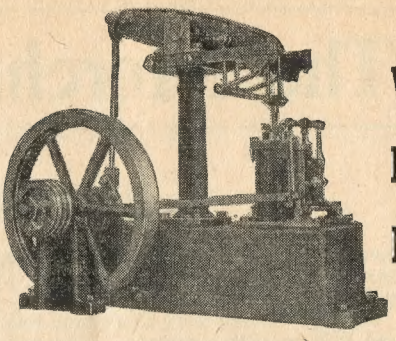

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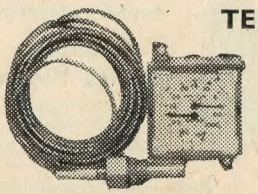

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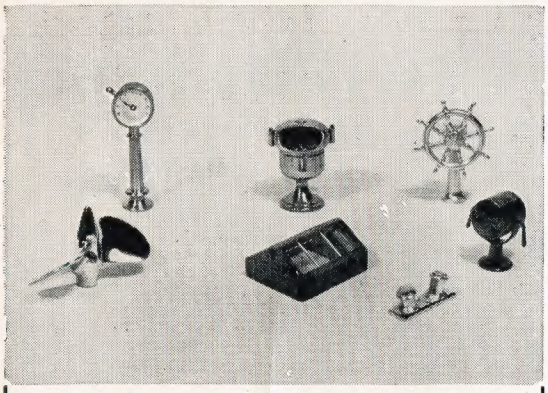

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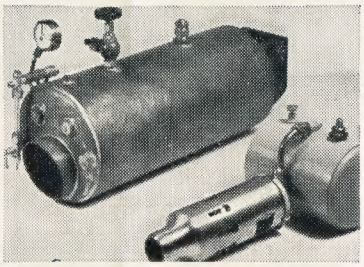

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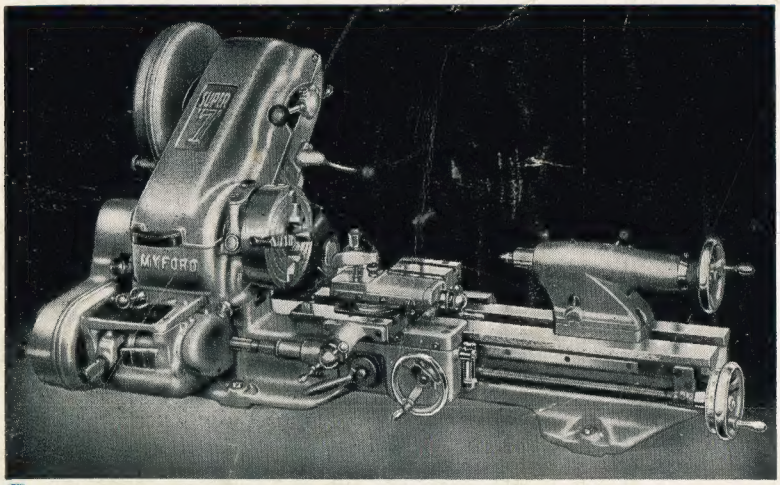

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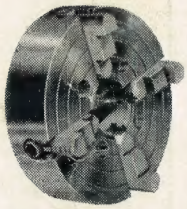

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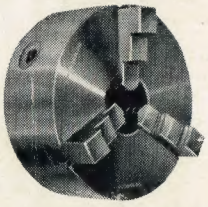

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